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A RESEARCH ON OPEN CLUSTERS

BY

SIGFRID RAAB

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SIGFRID RAAB

LIC. PHIL., Hb.

BY DUE PERMISSION OF THE PHILOSOPHICAL FACULTY OF LUND
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WITH 26 PLATES

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Introduction.

This research may be considered a continuation of the account of a preliminary research on the ordinary or open clusters given by Professor C. V. L. Charlier in *Medd. från Lunds Observatorium*, Serie II, No. 19. In the work just mentioned Charlier treats also of the globular clusters; these are left out of account in this research.

The observation material is taken exclusively from the Franklin-Adams charts in the possession of the Lund Observatory; as is well known, the original plates of these charts have been examined as to the star clusters by P. J. Melotte, and the results of this examination have been published in: »A catalogue of star clusters shown on Franklin-Adams Chart Plates» (M. A. S. Vol. LX, 1915).

Melotte divides the star clusters into the following four classes:

- I. Globular clusters (highly concentrated).
- II. Loose clusters having a regular and well defined outline.
- III. Loose clusters often consisting of a small number of stars and having an outline more or less irregular and not so sharply defined as in the former case. A direct estimation of the diameters of these clusters may involve great errors. Of course, it is often very difficult to decide to which class (II or III) a star cluster should be referred.
- IV. Coarse clusters: these form only a small number, and comprise the Pleiades, the Hyades and a few other groups.

It is the classes II and III that are the object of this research. In Melotte's Catalogue are included 146 clusters belonging to the classes II and III. Many of these clusters contain stars so faint that, according to Melotte's account, they cannot be distinctly seen on the Franklin-Adams Plates whose limiting magnitude lies between the sixteenth and seventeenth magnitudes. On the charts the limiting magnitude lies at about the 15th magnitude and therefore the above-mentioned star clusters are not visible there, and have had to be excluded in my research. The rest, about 130, are visible on the charts, and form the object of this research. Among these are about ten which are not included either in N. G. C. or in Charlier's Memoir. In Melotte's Catalogue, on the other hand, are not to be found N. G. C. 1817 and N. G. C. 6623, which have been taken up and described by me.

Moreover, I have treated M-e 102, (not in N. G. C.) classed by Melotte as IV, but which, in my opinion, ought to be referred to Melotte's class II. The total number of clusters given by me in Table II amounts to 152. I have divided them into four types: T I: regular and distinctly condensed; T II: regular and not distinctly condensed; T III: irregular and distinctly condensed; T IV: irregular and not distinctly condensed.

When I began this research, it was my intention to examine the star clusters exclusively from a statistic point of view with regard to the number of stars, the size of the apparent diameters and, if possible, with a computation of their distances. When, however, my work, which was begun in the autumn of 1918, had been going on for some time, the Henry Draper Catalogue came into the possession of the Lund Observatory (the volumes containing stars with $\alpha = 20^h - 24^h$ are, however, still missing). By this I got an excellent opportunity of extending my research and a good material for determining the distances of the star clusters. My not having had access to the latest volumes of D. C. is of but little consequence. Only about 15 star clusters are affected by this and by far the greatest part of these contain so faint stars that none of them are included in D. C.

I have thought it appropriate to give, in the introduction, a summary of the contents of the different chapters:

Chapter I: gives an account of the method of determining the apparent diameters of the star clusters, the number of stars in each cluster and the mean magnitudes of the stars.

Chapter II: gives a complete derivation of Kapteyn's formula for the mean magnitude of a group of stars, situated at the same distance, to which formula I have given a form suitable for numeric calculation.

Chapter III: gives a complete account of the appearance of the star clusters, their coordinates, their positions on F. A. C. and the star density of the surroundings, the quality of the images on the charts, the types of the clusters, the apparent diameters, the number of stars visible on the charts and belonging to the clusters, and tables containing the stars whose magnitudes I have been able to correct (δ positive); further tables of the stars lying within the clusters and included in D. C., and the distribution of D. C.-stars in the surroundings of the resp. star clusters.

Chapter IV: gives an account of the determination of the distances of the star clusters where this was possible, correlation calculations and at last some general conclusions.

Abbreviations.

Abbreviations of works consulted.

- A. J. = Astronomical Journal.
Ap. J. = Astrophysical Journal.
A. N. = Astronomische Nachrichten.
H. A. = Annals of the Astronomical Observatory of Harvard College.
D. C. = The Draper Catalogue (H. A. 91—97).
L. M. I. = Meddelande från Lunds Astronomiska Observatorium, Serie I.
L. M. II = Meddelande från Lunds Astronomiska Observatorium, Serie II.
N. G. C. = New General Catalogue of Dreyer.
I. C. = Index Catalogue of Dreyer.
M-e. = Melotte's Catalogue in M. A. S. Vol. LX, 1915.
M. = Messier.
F. A. C. = The Franklin-Adams Charts.
M. A. S. = Memoirs of Royal Astronomical Society.

Other Abbreviations.

- α, δ = Equatorial coordinates.
 l, b = Galactic, longitude and latitude.
 d = Apparent diameter, expressed in arc-minutes.
 π = Parallax » » seconds
 r = Distance » » siriometer.
 a = » from the centre on F. A. C., expressed in mm.
 $\bar{n}$ = Mean star density in the environs of the star clusters (The area = 31.46 square-minutes).
 n = Number of stars in a cluster.
 I = Images on the F. A. C.
 T = Type of a cluster.
 m = The photometric magnitude (apparent).
 m' = » photographic » (»).
 M = Absolute magnitude.
Sp. = Spectral-type (Harvard).
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Chapter I.

A. On the determination of the apparent diameters of the star clusters.

The first object I have set before myself has been to obtain surer values of the apparent diameters of at least the star clusters which, according to f. inst. Melotte's estimation, are greater than $10'-12'$. A direct estimation makes the values very uncertain, as a star cluster always more or less gradually passes into its surrounding. The determinations hitherto made accordingly have, to a large extent, been dependent on the observer's arbitrary conception. To avoid this arbitrariness I have adopted the method proposed by Charlier in L. M. II: 19, a method which I will now describe and illustrate by some concrete cases.

In counting the stars, I have used the apparatus employed at the star counts made during the last few years at the Lund Observatory under the superintendence of Charlier. The field of view in the glass of the apparatus contains a large square divided into nine smaller ones, the sides of which latter correspond to 5.6 on F. A. C. At the beginning of the count, the centre of the cluster is placed in the centre of the field of view, that is to say in the central square.

Then I have counted the stars (and stated their magnitudes in relation to an artificial scale — placed in the field of view —) in each small square. For a great part of the star clusters the diameter is smaller than $3 \times 5.6 = 16.8$, and the cluster accordingly situated within the large square. In a great number of cases I have therefore considered it sufficient, in order to get the density of stars in the surroundings of the cluster, to read the number of the stars in the (large) squares immediately surrounding the central square. From these counts in the surrounding squares I have been able to determine the mean number of stars in a small square, which I have subtracted from the number of stars in each small square within the large central square. In the cases where the least suspicion could arise that the cluster might extend ever so little beyond the large central square, I have not made use of the immediately surrounding eight squares¹ in order to obtain the density in the surroundings of the clusters, but determined this from squares lying

¹ These will now, of course, be partly included in the cluster.

farther out. Thus I get the number of stars in each small square belonging to the cluster. The distribution may be somewhat dissymmetrical, but I have always computed the dispersion in the direction of the declination and at right angles to it (σ_x and σ_y). The diameter of the cluster may be appreciated at 5—6 times the dispersion. I have then computed the mean value (d) of the diameters in δ and α .

B. Determination of the number and the mean apparent ph. magnitudes of the stars belonging to a cluster.

My next aim was the determination of the mean apparent magnitudes of the stars in the clusters, which determination at the same time gives me the number of stars belonging to them and visible on F. A. C. From the counts I have made use of to get the number of stars in each small square in the neighbourhood of the cluster I can easily get the mean number of stars of every magnitude for each square. I then form the sums of the numbers of stars of every magnitude lying within the field occupied by the cluster in each special case. From these sums I subtract the numbers of stars¹ of a surrounding area which corresponds to the area of the cluster. The sums of these remainders give the number of stars belonging to the cluster. Then it is an obvious matter how to compute the mean magnitude. Examples illustrating how the counts were executed are given below:

N. G. C. 2090. M. 37 (M-e 38).

By a preliminary investigation I found at once that the cluster is lying within the 9 central great-squares (I—IX). Thus, to the environs I reckoned the surrounding 21 great squares and counted the stars within 30 great-squares and read off their magnitudes.

		δ ↑			
	21	22	23	24	25
	20	VII	VIII	IX	10
α ←	19	VI	I	II	11
	18	V	IV	III	12
	17	16	15	14	13

The great-squares.

¹ of the respective magnitudes

Total number of stars in the area of the cl.

Square \ m'	9	10	11	12	13	14	>14.5	Σ
I			1	2	19	76	138	236
II					2	20	54	76
III	1	1			5	17	30	54
IV	1				3	12	40	56
V		2		2	2	16	38	60
VI					1	15	59	75
VII				1	2	11	51	65
VIII					2	19	42	63
IX	1			1	3	6	42	53
S	3	3	1	6	39	192	494	738

The numbers S_1 may be reduced to the area within which the cl. is situated with security, i. e. in this case the nine great central-squares. Thus we multiply S_1 with $3/7$ we get the following series S_2 .

m'	10	11	12	13	14	>14.5
S_2	3	6	8	16	58	314

Number of stars in the environs.

Square \ m'	9	10	11	12	13	14	>14.5	Σ
10			1		3	5	34	43
11				2	2	11	21	36
12			1		1	6	27	35
13			1	5	3	4	31	44
14				3	3	9	35	50
15					1	7	32	40
16					1	4	31	36
17					2	7	42	51
18					1	10	42	53
19		1			1	5	43	50
20					1	5	32	38
21		1	1	1	3	6	27	39
22			1	2	3	14	37	57
23			1		2	6	39	48
24			3	1	3	7	22	36
25		2	1		1	5	40	49
26						4	39	43
27		1	1	2		3	39	46
28				2	3	5	46	56
29			1		1	7	32	41
30		1	1		2	5	41	50
S_1		6	13	18	37	135	732	941

$$n = 5.0$$

These numbers S_2 are to be subtracted from the numbers S in the area, and we get the numbers R .

m'	9	10	11	12	13	14	>14.5	Σ
R	[3]	0	0	0	23	134	180	337

The correction of the magnitudes of this chart is calculated to — 1.7 magn. Thus we get the following series of numbers of stars within this cluster:

m'	11	12	13	>13.5
n_c	20	103	149	65

Calculation of the diameter of M. 37 (N. G. C. 2099).

A.

			5	6	4			
			5	9	7			
			6	10	10			
8	5	15	16	25	19	9	4	6
7	7	14	30	60	30	13	9	7
6	6	7	17	26	17	11	8	7
			6	13	8			
			5	6	10			
			3	3	2			

B.

					$+y$				
					1				
					4				
					5				
					20				
$+x$	2	2	9	25	55	25	8	4	2
					21				
					8				
					2				
					0				

x	F	$x \cdot F$	$x^2 \cdot F$
— 4	2	— 8	+ 32
— 3	4	— 12	36
— 2	8	— 16	32
— 1	25	— 25	25
0	55	0	0
+ 1	25	+ 25	25
+ 2	9	+ 18	36
+ 3	2	+ 6	18
+ 4	2	+ 8	32
Σ	132	— 4	+ 236

$$b = -0.03$$

$$\tau_x = \sqrt{\frac{236}{132} - b^2}$$

$$\sigma_x = 1.34 = 7'.50$$

$$d_x = 37'.5 - 45'.0$$

y	F	$y \cdot F$	$y^2 \cdot F$
-3	2	-6	+18
-2	8	16	32
-1	21	21	21
0	55	0	0
+1	20	+20	20
+2	5	10	20
+3	4	12	36
+4	1	4	16
Σ	116	+3	+163

$$b = +0.03$$

$$\sigma_y = \sqrt{\frac{163}{116} - b^2}$$

$$\sigma_{\nu} = 1.19 = 6'.66$$

$$d_y = 33'.3 - 40'.0$$

$$d = 35' - 43'.$$

A contains the number of stars in the small squares within the great squares I, II, IV, VI, VIII.

The mean number of stars ($\bar{n}$) in a small square in the environs is, in this case 5.0, which number is to be subtracted from the middle-rows. So I get numbers in B., which are to be used for the calculation of the dispersion in x and y .

Præsepe. *N. G. C. 2632*. M. 44 (M-e 88).

By a preliminary investigation I found at once that the diameter is about 2° and that the cl. is lying within the 81 central great squares (I—81). Thus to the environs I reckoned the surrounding 40 great-squares and counted the stars within 121 great-squares and read off their magnitudes.

Total number of stars in the area of the cl.

m' Squares	8	9	10	11	12	13	14	>14.5	Σ
I	2	5	0	3	3	3	4	13	33
II—IX	3	10	7	14	12	17	25	67	155
10—25	2	6	12	13	13	23	46	164	279
26—49	1	4	7	7	16	30	58	240	363
50—81	1	5	12	15	31	41	80	288	473
S	9	30	38	52	75	114	213	772	1303

The numbers S_1 may be reduced to the area within which the cl. is situated with security, i. e. in this case the 81 great central-squares. Thus we multiply S_1 with $^{81}_{40}$. We get the following series S_2 .

m'	8	9	10	11	12	13	14	>14.5
S_2	2	12	18	38	61	97	190	711

Number of stars in the environs.

m' Squares	8	9	10	11	12	13	14	>14.5	Σ
82—91			1	5	8	10	26	96	146
92—101		1	3	7	10	14	21	85	141
102—111	1	4	2	3	6	10	22	84	132
112—121		1	3	4	6	14	25	86	139
S_1	1	6	9	19	30	48	94	351	558

These numbers S_2 are to be subtracted from the numbers S in the cluster-area, and we get the numbers R .

m'	8	9	10	11	12	13	14	>14.5
R	7	18	20	14	14	17	23	61

The correction of the magnitudes of this chart is calculated to -1.1 magn. Thus we get the following series of number of stars.

m'	6	7	8	9	10	11	12	13	>13.5
n	1	7	19	19	14	15	17	23	59

Chapter II.

Deduction of the formula for the determination of the distance (r) to a cluster (the mean value of the apparent magnitude of the stars being known).

This formula was first given by Kapteyn (in Mt. Wilson Contr. 82, 1914). As in several cases I have found in the Henry Draper Catalogue numerous stars of the same spectral type belonging to a cluster, it is easily understood that here may possibly be an occasion to make use of Kapteyn's formula. I have thought it suitable to deduce the formula in two ways, the first of which leads to the same form as that of Kapteyn. The other way leads to a formula which is more suitable for numerical calculations.

First method: If we assume that the distance r is the same for all stars in the cluster, the frequency function of the apparent magnitude gets the same form and the same dispersion as the frequency function of the absolute magnitude.

For the frequency function in the absolute magnitude we suppose the normal form to be

$$\varphi(M) = C \cdot e^{-\frac{(M - M_0)^2}{2\sigma^2}} \quad (1)$$

Then the frequency function of the apparent magnitude gets the following form:

$$\varphi(m) = C \cdot e^{-\frac{(m - m_0)^2}{2\sigma^2}} \quad (2)$$

A well known formula gives us:

$$M = m - 5 \log r \quad (3)$$

This formula postulates that M is defined as the star's apparent magnitude, if the star is at the unit distance (one siriometer).

The formula (2) is now:

$$\varphi(m) = C \cdot e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \quad (3')$$

We consequently obtain the following equation for determining the mean value of the apparent magnitude (m) of stars brighter than m_1 :

$$\bar{m} = \frac{\int_{-\infty}^{m_1} m \cdot e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \cdot dm}{\int_{-\infty}^{m_1} e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \cdot dm}. \quad (\text{A})$$

We put:

$$m = (m - 5 \log r - M_0) + (5 \log r + M_0).$$

Equ. (A) then takes the following form:

$$\begin{aligned} \bar{m} = & \frac{\int_{-\infty}^{m_1} (m - 5 \log r - M_0) \cdot e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \cdot dm}{\int_{-\infty}^{m_1} e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \cdot dm} + \\ & + \frac{\int_{-\infty}^{m_1} (5 \log r + M_0) \cdot e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \cdot dm}{\int_{-\infty}^{m_1} e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \cdot dm}. \end{aligned}$$

The second term in $\bar{m}$ evidently becomes:

$$5 \log r + M_0$$

To obtain the value of the first term we observe that:

$$\frac{d \left(e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \right)}{dm} = - \frac{m - 5 \log r - M_0}{\sigma^2} \cdot e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}}.$$

Thus we obtain:

$$\bar{m} = - \frac{\int_{-\infty}^{m_1} \frac{(m - 5 \log r - M_0)^2}{2\sigma^2} \cdot e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \cdot dm}{\int_{-\infty}^{m_1} e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \cdot dm} + 5 \log r + M_0 \quad (\text{A}')$$

or at last:

$$\bar{m} = 5 \log r + M_0 - \frac{\sigma^2 \cdot e^{-\frac{(m_1 - 5 \log r - M_0)^2}{2\sigma^2}}}{\int_{-\infty}^{m_1} e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \cdot dm}. \quad (\text{B})$$

We introduce (like Kapteyn) the following indications:

$$z = + \frac{m - 5 \log r - M_0}{\sigma \sqrt{2}} \quad \text{and} \quad P = \frac{m_1 - 5 \log r - M_0}{\sigma \cdot \sqrt{2}}$$

for which reason $m = m_1$ gives $z = P$.

We then get:

$$dz = \frac{1}{\sigma \cdot \sqrt{2}} \cdot dm.$$

Formula (B) now takes the following form:

$$\bar{m} = 5 \log r + M_0 - \frac{\sigma}{\sqrt{2}} \cdot \frac{e^{-P^2}}{\int_{-\infty}^P e^{-z^2} \cdot dz}. \quad (C)$$

or, if we want a form more suitable for numerical calculations:

$$m_1 - \bar{m} = m_1 - 5 \log r - M_0 + \frac{\sigma}{\sqrt{2}} \cdot \frac{e^{-P^2}}{\int_{-\infty}^P e^{-z^2} \cdot dz}, \quad (C')$$

We now put:

$$\frac{m_1 - \bar{m}}{\sigma \cdot \sqrt{2}} = F(P).$$

Then, at last, we get:

$$F(P) = P + \frac{1}{2} \cdot \frac{f(P)}{Q(P)}. \quad (D)$$

where $f(P)$ is the function of probability.

As for $Q(P) = \int_{-\infty}^P e^{-z^2} \cdot dz$ we divide it in the following manner:

$$Q(P) = \int_{-\infty}^0 e^{-z^2} \cdot dz + \int_0^P e^{-z^2} \cdot dz = \frac{1}{2} \cdot \sqrt{\pi} + \int_0^P e^{-z^2} \cdot dz,$$

where the second term is the known integral of probability.

Second method:

We can also proceed in the following manner:

We put:

$$p(x) = \frac{e^{-\frac{x^2}{2}}}{\sqrt{2\pi}} \quad (4)$$

Then we have:

$$\bar{m} = \frac{\int_{-\infty}^{m_1} m \cdot p \left(\frac{m - 5 \log r - M_0}{\sigma} \right) dm}{\int_{-\infty}^{m_1} p \left(\frac{m - 5 \log r - M_0}{\sigma} \right) \cdot dm} \quad (a)$$

Further we put:

$$x = \frac{m - 5 \log r - M_0}{\sigma}$$

and

$$x_1 = \frac{m_1 - 5 \log r - M_0}{\sigma}$$

and then $dm = \sigma \cdot dx$.

The formula (a) now gets the following form:

$$\bar{m} = \frac{\int_{-\infty}^{x_1} (5 \log r + M_0 + \sigma \cdot x) \cdot p(x) \cdot \sigma \cdot dx}{\int_{-\infty}^{x_1} p(x) \cdot \sigma \cdot dx} \quad (b)$$

σ disappears.

But:

$$\begin{aligned} \int_{-\infty}^{x_1} x \cdot p(x) \cdot dx &= \int_{-\infty}^{x_1} x \cdot \frac{e^{-\frac{x^2}{2}}}{\sqrt{2\pi}} \cdot dx = -\frac{1}{\sqrt{2\pi}} \cdot \int_{-\infty}^{x_1} d \left(e^{-\frac{x^2}{2}} \right) = \\ &= -\frac{1}{\sqrt{2\pi}} \int_{-\infty}^{x_1} e^{-\frac{x^2}{2}} = -\frac{1}{\sqrt{2\pi}} \cdot e^{-\frac{x_1^2}{2}} = -p(x_1). \end{aligned}$$

We denote:

$$\int_{-\infty}^{x_1} p(x) dx = Q(x_1).$$

Then (b) at last takes the following form:

$$\bar{m} = 5 \log r + M_0 + \frac{\sigma \cdot \int_{-\infty}^{x_1} x \cdot p(x) \cdot dx}{\int_{-\infty}^{x_1} p(x) \cdot dx}$$

or:

$$\bar{m} = 5 \log r + M_0 - \frac{\sigma \cdot p(x_1)}{Q(x_1)}. \quad (c)$$

From this we get:

$$m_1 - \bar{m} = m_1 - 5 \log r - M_0 + \frac{\sigma \cdot p(x_1)}{Q(x_1)}$$

or:

$$\frac{m_1 - \bar{m}}{\sigma} = \frac{m_1 - 5 \log r - M_0}{\sigma} + \frac{p(x_1)}{Q(x_1)}$$

or:

$$\frac{m_1 - \bar{m}}{\sigma} = x_1 + \frac{p(x_1)}{Q(x_1)} = F(x_1). \quad (d)$$

We are now able to tabulate the values of $F(x)$ with x as argument.

If we compare formula (D) with formula (d), the former gives $\frac{m_1 - \bar{m}}{\sigma \cdot \sqrt{2}}$; the latter $\frac{m_1 - \bar{m}}{\sigma}$.

I intend hereafter to use the formula (d).

Let us now examine a little more closely the formula (d):

$$\frac{m_1 - \bar{m}}{\sigma} = F(x_1) = x_1 + \frac{p(x_1)}{Q(x_1)}.$$

We will suppose that m_1 , $\bar{m}$ and σ for a certain cluster are known. Then the value of $F(x_1)$ is also given. In Tab. I we find the corresponding value of x_1 . But the equation:

$$x_1 = \frac{m_1 - 5 \log r - M_0}{\sigma}$$

will at last give us the value of r , if the value of M_0 is also known.

Remark: Tab. I has been computed with the help of Sheppard's Tables.

Chapter III.

In this chapter is given an account as complete as possible of 152 open clusters. This is based on F. A. C. and D. C. In the tables to the left are given the Plate-number of the cluster, α and δ , Galactic square; the number of F. A. C., where the star cluster is to be found, the distance (a) of the image from the centre of the chart, the mean density ($\bar{n}$ = the number of stars in a small square whose area is 31.56 square-minutes), the quality of the image [division into three classes: I: very good; II: good; III: bad (deformed)]; the Type (see the Introduction!); the number (n) of stars, belonging to the cluster and visible on the chart and the number of stars of the different Spectral-classes, included in D. C. * (n_B , n_A , etc.); the apparent diameters (d): for the large clusters determined by the limits 5 σ and 6 σ ; for the smaller determined through direct estimation, which is indicated by the sign [].

Further I have given a short description of each cluster, in doing which I have endeavoured to indicate the peculiarities that may be found in the appearance of the clusters, in the distribution of the stars, etc. In many cases the accounts also contain a Tab. A of the stars which, being situated within the area of the cluster, are included in D. C. Thus I have noted from D. C. the stars, situated within a square, the side of which is = the diameter of the cluster (in the cases where the diameter of the cluster is determined by to limits I have chosen the lower one as the side of the square). Then, in order to decide which stars should be excluded, I have at the same time noted the D. C. stars in an area 15 times as large as that of the cluster and formed the tab. B for the stars situated outside the cluster in this large area. In every fifteen stars of a certain type, for inst. $A\ 0$, I have, as a rule, excluded *one* star of the same type within the cluster area. In doing so I have, of course, taken into consideration, the number of stars of the different magnitudes in the environs (as is seen from N. 69, N. G. C. 2516, where I give a special table for $B\ 9$ and $A\ 0$, and from the table of N. G. C. 3532 for $B\ 8$, $B\ 9$, $A\ 0$ and $A\ 2$, which follows below). Accordingly, I have sometimes modi-

* To the A: stars I have referred $B\ 8$ — $A\ 5$.

fied the excluding of one star in every fifteen. In Tab. B I have thought it unnecessary to separate for inst. $G\ 0$, $G\ 2$, etc., when there are no G -stars in the cluster area.

Lastly we have Tab. C, containing stars, which, according to the computations, belong to the cluster with corrected magnitudes (m').

The estimated magnitudes have been reduced to photographic magnitudes in the international system with help of a series of corrections, deduced by Mr. John Ohlsson.

These corrections have been obtained by estimating the chart magnitudes in the artificial scale for the Standard Stars which are to be found in 1: Standards of magnitudes for the Astrographic Catalogue (in H. A. Vol. 85, N:o 1); 2: The North Polar Sequence (in H. A. Vol. 71, N:o 3); 3: Harvard Standard Regions (in H. A. 71, N:o 4); 4: Durchmusterung of Selected Areas between $\delta=0$ and $\delta=+90^\circ$ (H. A. Vol. 101) and the comparison stars, which have been used at Harvard in determining the magnitudes of certain variables and novæ (in H. A. Vol. 84, N:o 1, 3, 5).

For each area points have been plotted having abscissas equal to the estimated magnitudes and ordinates equal to the differences, found by subtracting the estimated magnitudes from the Harvard-magnitudes. A smooth curve was drawn through these points. From these curves the corrections have been deduced which are to be added to the estimated magnitudes to get the magnitudes in the Harvard Scale. As the corrections of the resp. magnitudes are generally almost equal in a certain point of a chart, I have been able to use the same correction for the different magnitudes. Where the corrections were found to be unequal in different places of F. A. C. I have always used the corrections of such points as were nearest to the cluster.

After the corrections were applied, I have graphically reduced the numbers to whole magnitudes. In Tab. C $m'=9$ signifies that the magnitude of a star lies between $m'=8,5$ and $m'=9,5$.

Remark: As the material at our disposal was insufficient, corrections for the charts with δ negative could not be deduced.

N. G. C. 3532.

Table, containing the stars, found in D. C. and situated inside and outside the cl.
and showing how certain stars have been excluded from the cl. [] indicates
the excluding.

Inside		Outside		Inside		Outside		Inside		Outside	
B 8				A 0				A 0			
n	m	n	m	n	m	n	m	n	m	n	m
1	8.0	3	7.9—8.1	1	8.9	9	8.9	1	10.0		
»	8.3	6	8.2—8.5	»	8.9			»	[10.0]		
»	8.8	5	8.6—8.8	»	8.9			»	10.2	1	10.1
»	8.9	15	8.9—9.2	»	8.9			»	10.2	4	10.2
»	[9.0]	10	9.4—10.0	»	[8.9]			»	10.2		
»	[9.7]			»	9.1	6	9.0	»	10.2		
				»	9.1	10	9.1	»	10.3	2	10.3
				»	9.1			»	10.3		
				»	9.1						
				»	9.1			A 2			
				»	9.1			»	8.4	1	8.4
»	8.2	2	8.3	»	9.1			»	8.5	1	8.5
»	8.5	3	8.4	»	[9.1]			»	8.6	2	8.6
»	8.5	1	8.5	»	9.2	1	9.2	»	8.6		
»	8.6			»	9.2			»	8.7	2	8.7
»	8.7	3	8.7	»	9.2			»	8.7		
»	8.7	1	8.8	»	9.4	12	9.4	»	8.7		
»	8.8	1	8.8	»	9.4			»	8.7		
»	8.9	6	8.9	»	9.4			»	[8.7]		
»	[8.9]			»	9.4			»	8.8	1	8.8
»	9.1	7	9.1	»	[9.4]			»	8.8	1	8.9
»	9.1	3	9.4	»	9.5			»	9.0	2	9.0
»	[9.1]	1	9.5	»	9.5	7	9.5	»	9.0		
»	9.5	1	9.6	»	9.5	2	9.6	»	9.0		
»	9.7	3	9.7	»	[9.5]			»	9.0		
»	[9.7]	2	9.8	»	9.7	17	9.7	»	9.1	1	9.1
				»	9.7			»	9.3	2	9.3
				»	9.7			»	9.3		
				»	9.7			»	9.3		
				»	9.7			»	9.3		
				»	9.7			»	9.4	2	9.4
»	8.2	1	8.2	»	[9.7]	1	9.8	»	9.6	4	9.6
»	8.2	4	8.3	»	9.9	1	9.9	»	9.8	1	9.7
»	[8.4]	4	8.4	»	10.0	16	10.0	»	9.9	1	9.8
»	8.5	4	8.5	»	10.0			»	9.9	11	9.9
»	8.6	3	8.6	»	10.0			»	9.9		
»	8.7	2	8.7	»	10.0			»	[9.9]		
»	8.7			»	10.0			»	10.1	1	10.1
»	8.7			»	10.0			»	10.2	3	10.2
»	8.8	4	8.8	»	10.0			»	10.2		
»	8.8			»	10.0			»	10.2		

N. G. C. 188 (M-e 2).

This cl. is not distinctly shown on the chart.

1.

$\alpha = 0^h 35.^m 1$
 $\delta = + 84^\circ 47'$
*GC*₃ F. A. C. 206

2.

Pl. 1.
 $\alpha = 1^h 9.^m 4$
 $\delta = + 58^\circ 17'$
*GD*₄
 F. A. C. 183
 $\bar{n} = 4.6 \quad a = 46$
I II T III
 $d = [6] \quad n = 24$

N. G. C. 436 (M-e 6).

Contains a comparatively small number of faint stars, rather irregularly dispersed; some are lying very close together. Differs distinctly from the environs. No stars in D. C.

TAB. C ($c = -1.0$).

m'	11	12	13	> 13.5
n	1	2	5	16

N. G. C. 457 (M-e 7).

Contains a tolerable number of middle-bright stars, strongly condensed. The form rather circular; yet a couple of offshoots.

3.

Pl. 1.
 $\alpha = 1^h 12.^m 8$
 $\delta = + 57^\circ 48'$
*GD*₄
 F. A. C. 183
 $\bar{n} = 4.1 \quad a = 47$
I II T III
 $d = 17-20$
 $n = 50 \quad n_B = 1?$

TAB. A.

α	δ	m	m'	Sp.
$1^h 13.^m 6$ 13.8	$+ 57^\circ 40'$ 42	7.9 5.25	7.8 5.67	[B 5] [F' 5 p]

TAB. B.

n	Sp.
1	B 1
1	A 2
1	F 5
1	Mb

TAB. C. ($c = -1.0$).

m'	10	11	12	13	> 13.5
n	5	5	7	9	24

N. G. C. 581 M. 103 (M-e 8).

Circular, well defined. 3' from the centre, diametrically opposed; lie two stars, very bright in comparison with the other stars of this cl. Both of them are noted in D. C.

4.

Pl. 1.
 $\alpha = 1^h 26.^m 6$
 $\delta = + 60^\circ 11'$
*GD*₄
 F. A. C. 183
 $\bar{n} = 6.5$
 $a = 5$
I II T I
 $d = [7] \quad n = 46$
 $n_B = 1? \quad n_F = 1?$

TAB. A.

α	δ	m	m'	Sp.
$1^h 26.^m 6$ 27.1	$+ 60^\circ 10'$ 7	7.26 8.21	7.09 8.49	B 3 F 0

TAB. B.

n	Sp.
1	K 2

TAB. C ($c = -1.0$).

m'	7	8	9	10	11	12	13	> 13.5
n	1	1	0	1	1	4	8	30

N. G. C. 654 (M-e 9).

Very well separated from the environs. Is one of the best specimens of clusters with a small number of stars. No stars in D. C.

5.
Pl. 1.
 $\alpha = 1^h 37.^m 2$
 $\delta = + 61^\circ 23'$
 GC_4
F. A. C. 183
 $\bar{n} = 4.1$ $a = 23$
II T I
 $d = [6]$ $n = 21$

TAB. C ($c = -1.0$).

m'	11	12	13	> 13.5
n	1	4	7	9

N. G. C. 659 (M-e 10).

Contains only a small number of faint stars, and is not clearly separated from the environs. No stars in D. C.

6.
Pl. 1.
 $\alpha = 1^h 37.^m 4$
 $\delta = + 60^\circ 12'$
 GD_4
F. A. C. 183
 $\bar{n} = 5.3$ $a = 15$
II T III
 $d = [6]$ $n = 22$

TAB. C ($c = -1.0$).

m'	11	12	13	> 13.5
n	1	3	4	14

N. G. C. 663 (M-e 11).

Very well defined and fairly regular in form. Contains two rather dense accumulations of stars, separated by a thin region ($2' - 3'$ wide). Besides, there appear a couple of offshoots with fairly bright stars. No stars in D. C.

7.
Pl. 1.
 $\alpha = 1^h 39.^m 2$
 $\delta = + 60^\circ 44'$
 GD_4
F. A. C. 183
 $\bar{n} = 5.1$ $a = 20$
II T III
 $d = 18-22$
 $n = 82$

TAB. C. ($c = -1.0$).

m'	9	10	11	12	13	> 13.5
n	1	3	6	7	8	57

N. G. C. 752 (M-e 12).

A large cl., very thin even at the centre. No perceptible condensation. Fairly regular form. At the centre are to be found many stars which lie by twos very close together. Not well separated from the surroundings.

8.
Pl. 2.
 $\alpha = 1^h 51.^m 8$
 $\delta = + 37^\circ 11'$
 GD_4
F. A. C. 165
 $\bar{n} = 2.4$ $a = 145$
II T III
 $d = 53-64$
 $n = 103$ $n_A = 1$
 $n_G = 2$ $n_K = 3$

TAB. A.

α	δ	m	m'	Sp.
$1^h 53^m .0$	$+ 37^\circ 12'$	8.1	8.2	<i>A 2</i>
49.9	22	8.2	9.0	<i>G 5</i>
50.8	33	9.2	9.8	<i>G</i>
50.8	32	9.3	9.9	
50.2	36 46	5.82	6.82	<i>K 0</i>
51.7	37 11	8.2	9.2	
50.0	36 47	6.06	7.13	<i>K 2</i>

TAB. B.

n	Sp.
7	<i>A 0</i>
2	<i>A 2</i>
3	<i>A 5</i>
11	<i>F</i>
4	<i>G 0</i>
5	<i>G 5</i>
3	<i>K 0</i>
2	<i>M</i>

TAB. C (c = - 1.1).

m'	7	8	9	10	11	12	13	> 13.5
n	2	3	9	30	16	6	17	20

N. G. C. 869 (M-e 13).

9.

Pl. 2.

$\alpha = 2^h 12.^m 0$

$\delta = +56^\circ 41'$

GD_4

F. A. C. 183

$\bar{n} = 3.0$ $a = 95$

I II T III

$d = 42-51$

$n = 274$

$n_B = 10$ $n_A = 4$

$n_K = 1$

Very strong condensation, so that the stars at the centre are difficult to distinguish on the chart. Presents another dense crowd of stars outside the centre. Between N. G. C. 869 and 884, which form a double-cluster in Perseus, there is an almost starless belt, 3' wide.

TAB. A.

α	δ	m	m'	Sp.	α	δ	m	m'	Sp.
$2^h 12.^m 1$	$+56^\circ 40'$	6.66	6.42	B 0	$2^h 10.^m 3$	$+56^\circ 26'$	9.0	8.9	B 5
12.2	43	6.66	6.42	,	10.2	19	8.9	8.9	B 8
9.9	36	6.42	6.20	B 1p	11.7	18	9.5	9.5	,
9.8	34	7.21	6.99	B 1	12.4	41	9.4	9.2	B
11.4	33	8.7	8.5	B 2	12.8	52	8.0	8.0	A 0
10.8	33	8.8	8.6	,	10.4	54	8.2	8.2	[,]
11.4	45	8.6	8.5	B 5	11.1	57	9.5	9.5	[,]
13.2	39	8.6	8.5	,	12.6	3	9.7	9.8	A 3
					13.4	56 32	8.2	9.4	K 5

TAB. B.

n	Sp.	n	Sp.
4	B 0	10	A 2
3	B 1	11	A 3
4	B 2	2	A
6	B 3	15	F
1	B 5	12	G
7	B 8	11	K 0
12	B 9	17	K 2
6	B	5	K 5
35	A 0	1	O e

TAB. C (c. = - 1.0).

m'	6	7	8	9	10	11	12	13	> 13.5
n	3	1	8	31	34	40	34	43	80

N. G. C. 884 (M-e 14).

10.

Pl. 2.

$$\alpha = 2^h 15.^m 4$$

$$\delta = + 56^\circ 39'$$

*GD*₄

F. A. C. 183

$$\bar{n} = 3.0 \quad a = 102$$

I II T I

$$d = 46-55$$

$$n = 270$$

$$n_B = 6 \quad n_A = 8$$

$$n_G = 1 \quad n_M = 2$$

$$n_K = 3$$

The densest accumulation of the stars lies somewhat eccentrically. The form more regular than *N. G. C. 869*. Besides, a fairly equal distribution of the stars.

TAB. A.

α	δ	m	m'	Sp.	α	δ	m	m'	Sp.
$2^h 15.^m 2$	$+ 56^\circ 49'$	9.0	8.8	<i>B 0</i>	$2^h 17.^m 5$	$+ 56^\circ 46'$	9.7	9.7	<i>A 0</i>
14.8	27	8.5	8.3	<i>B 2</i>	19.3	27	9.7	9.7	[<i>A 0</i>]
14.1	25	8.9	8.7	<i>B 3</i>	14.8	47	6.54	6.60	[<i>A 2</i>] p
13.8	28	9.5	9.4	<i>B 5</i>	18.8	57 3	8.6	8.7	,
15.9	56	6.95	6.90	<i>B 8 p</i>	16.5	56 26	9.4	10.0	<i>G 0</i>
16.9	55	9.0	9.0	,	17.7	36	9.5	10.7	<i>K 5</i>
18.4	44	9.2	9.2	,	13.9	42	var.	var.	,
19.2	37	8.7	8.7	<i>B 9</i>	16.3	46	,	,	,
15.6	38	9.2	9.2	[<i>B 9</i>]	18.3	57 0	8.5	9.9	<i>Ma</i>
14.9	42	8.6	8.4	<i>B</i>	15.3	56 39	var.	var.	,
14.7	56	9.4	9.2	, p					
19.2	47	7.42	7.42	<i>A 0</i>					
15.8	47	7.46	7.46	[<i>A 0</i>]					
18.7	52	8.8	8.8	,					

TAB. B.

n Sp.
The same as that of <i>N. G. C. 869</i>

TAB. C ($c = -1.0$).

m'	6	7	8	9	10	11	12	13	> 13.5
n	1	2	3	25	43	26	31	49	90

Melotte 15 (Not in *N. G. C.*).

11.

Pl. 3.

$$\alpha = 2^h 25.^m 2$$

$$\delta = + 61^\circ 0'$$

*GC*₄

F. A. C. 183

$$\bar{n} = 1.9 \quad a = 101$$

I II T III

$$d = 23-27$$

$$n = 42 \quad n_B = 3$$

An irregular but well defined cl. Most of the stars are lying close together at the centre from which several offshoots branch off in irregular form.

TAB. A.

α	δ	m	m'	Sp.
$2^h 25.^m 1$	$+ 61^\circ 1'$	7.82	7.58	<i>B</i>
25.2	60 56	8.0	7.8	,
25.7	61 5	8.4	8.2	,

TAB. B.

n	Sp.
1	<i>B 8</i>
2	<i>A</i>
2	<i>F</i>
1	<i>G</i>

TAB. C ($c = -1.0$).

m'	8	9	10	11	12	13	> 13.5
n	3	4	5	9	4	5	12

N. G. C. 1027 (M-e 16).

12.

Pl. 1.

$$\alpha = 2^h 35.^m 0$$

$$\delta = + 61^\circ 7'$$

GC_4

F. A. C. 184

$$\bar{n} = 4 \quad a = 70$$

I II T IV

$$d = 18-22$$

$$n = 40$$

TAB. C ($c = -1.2$).

m'	9	10	11	12	13	> 13.5
n	1	3	4	7	10	15

N. G. C. 1039. M. 34 (M-e 17).

13.

Pl. 3.

$$\alpha = 2^h 35.^m 6$$

$$\delta = + 42^\circ 21'$$

GD_4

F. A. C. 166

$$\bar{n} = 4.6 \quad a = 41$$

I II T III

$$d = 39-47$$

$$n = 71 \quad n_A = 11$$

$$n_G = 1$$

Contains a great number of bright stars. The number of the faint stars is comparatively small. The former lie close together; two of them cover each other partly. Fairly irregular form. Rather well defined.

TAB. A.

α	δ	m	m'	Sp.
$2^h 35.^m 7$	$+ 42^\circ 17'$	8.0	8.0	<i>B 8</i>
36.3	24	7.9	7.9	<i>B 9</i>
35.8	16	8.0	8.0	"
35.1	10	8.08	8.06	"
35.5	22	8.0	8.0	<i>A 0</i>
35.6	22	8.0	8.0	"
35.4	21	8.2	8.2	"
34.8	15	8.8	8.8	"
34.0	4	9.2	9.2	"
37.1	12	8.6	8.7	<i>A 2</i>
34.6	27	8.9	8.9	<i>A</i>
36.2	10	7.50	8.28	<i>G 5</i>

TAB. B.

n	Sp.
1	<i>B 8</i>
2	<i>B 9</i>
8	<i>A 0</i>
2	<i>A 2</i>
2	<i>A 3</i>
1	<i>A</i>
4	<i>F</i>
1	<i>G 0</i>
3	<i>G 5</i>
8	<i>K</i>

TAB. C ($c = -1.1$).

m'	8	9	10	11	12	13	> 13.5
n	8	6	8	14	18	15	2

14.

Pl. 1.

$$\alpha = 3^h 7.^m 8$$

$$\delta = + 46^\circ 52'$$

GD_4

F. A. C. 166

$$\bar{n} = 6.5 \quad a = 71$$

I II T I

$$d = [7] \quad n = 55$$

N. G. C. 1245 (M-e 18 *).

A small and dense, well defined and condensed cl. which contains exclusively faint stars. No stars in D. C.

TAB. C ($c = -1.1$).

m'	12	13	> 13.5
n	2	10	43

* Melotte has confused the descriptions and the diameters of *N. G. C.* 1039 and 1245.

N. G. C. 1342 (M-e 21).

15.
Pl. 1.
 $\alpha = 3^h 25.^m 2$
 $\delta = +36^\circ 59'$
 GD_5
F. A. C. 144
 $\bar{n} = 1.3$ $a = 145$
 $I III$ $T II$
 $d = 21-25$
 $n = 32$ $n_A = 1$
 $n_F = 1$

According to Melotte this cl. should not be well defined. On the contrary, the cl. detaches itself very distinctly from the environs. Contains numerous rather bright stars. No condensation; the stars equally dispersed.

TAB. A.

α	δ	m	m'	Sp.
$3^h 25.^m 2$	$+36^\circ 59'$	8.8	8.9	A 2
25.5	37 9	8.3	8.6	F 0

TAB. B.

n	Sp.	n	Sp.
1	B 9	1	F 5
1	A 0	2	G
1	A 2	2	K

TAB. C ($c = -1.3$).

m'	8	9	10	11	12	13	> 13.5
n	1	2	7	8	6	4	4

16.

Pl. 4.
 $\alpha = 4^h 7.^m 8$
 $\delta = +50^\circ 59'$
 GC_4
F. A. C. 167
 $\bar{n} = 2.8$ $a = 89$
 $I II$ $T III$
 $d = 31-38$
 $n = 35$ $n_A = 2$

N. G. C. 1528 (M-e 23).

A very plain but irregular cl. with several offshoots from the centre. The stars inequally dispersed; several dense groups are to be observed.

TAB. A.

α	δ	m	m'	Sp.
$4^h 7.^m 4$	$+50^\circ 59'$	8.9	9.0	A 2
9.0	51 7	8.7	8.7	A

TAB. B.

n	Sp.	n	Sp.
1	B 3	2	F
3	A 0	2	G
1	A 2	6	K
2	A		

TAB. C ($c = -0.3$).

m'	9	10	11	12	13	> 13.5
n	2	5	10	6	5	7

I. C. 361 (M-e 24).

17.
 $\alpha = 4^h 10.^m 7$
 $\delta = +58^\circ 3'$
 GC_4
F. A. C. 185.

Is not distinctly shown on the chart. Only a shading is visible.

N. G. C. 1647 (M-e 26).

18.
Pl. 4.
 $\alpha = 4^h 40.^m 2$
 $\delta = +18^\circ 53'$

A large, very thin cl., distinctly separated from the environs and probably containing exclusively bright stars. No condensation and rather equal dispersion. The brightest star is situated near the centre.

GD_5

F. A. C. 121

$\bar{n} = 4.4$ $a = 87$

I I T III

$d = 48-58$

$n = 68$ $n_A = 3$

$n_K = 2$

TAB. A.

α	δ	m	m'	Sp.
$4^h 39.^m 7$	$+19^\circ 8'$	8.4	8.4	<i>B 9</i>
41.1	18 31	9.3	9.3	"
41.0	54	8.4	8.4	<i>A 0</i>
40.4	33	6.13	7.13	<i>K 0</i>
40.2	37	7.8	8.8	"

TAB. B.

n	Sp.	n	Sp.
2	<i>A</i>	9	<i>G</i>
7	<i>A 0</i>	5	<i>K 0</i>
1	<i>A 2</i>	1	<i>K 2</i>
1	<i>A 3</i>	1	<i>M</i>
5	<i>F</i>		

TAB. C ($c = -0.9$).

m'	7	8	9	10	11	12	13	> 13.5
n	1	2	8	8	7	10	7	25

N. G. C. 1664 (M-e 27).

19.

Pl. 5.

$\alpha = 4^h 43.^m 9$

$\delta = +43^\circ 31'$

GC_5

F. A. C. 168

$\bar{n} = 4.4$ $a = 95$

I II T III

$d = 25-30$

$n = 64$ $n_B = 1$

$n_A = 1$

TAB. A.

α	δ	m	m'	Sp.
$4^h 44.^m 4$	$+43^\circ 24'$	7.37	7.25	<i>B 5</i>
43.8	19	8.9	8.9	<i>A 0</i>

TAB. B.

n	Sp.	n	Sp.
1	<i>B 9</i>	1	<i>F 0</i>
2	<i>A 0</i>	5	<i>G</i>
1	<i>A 5</i>	3	<i>K</i>
2	<i>A</i>		

TAB. C ($c = -0.9$).

m'	8	9	10	11	12	13	> 13.5
n	2	3	4	9	12	9	25

N. G. C. 1746 (M-e 28).

20.

Pl. 5.

$\alpha = 4^h 57.^m 6$

$\delta = +23^\circ 40'$

GD_5

F. A. C. 145

$\bar{n} = 1.9$ $a = 94$

I I T II

$d = 49-59$

$n = 95$ $n_B = 1$

$n_A = 1$ $n_K = 5$

TAB. A.

α	δ	m	m'	Sp.
$4^h 56.^m 2$	$+23^\circ 53'$	8.6	8.5	<i>B 5</i>
57.2	40	8.8	8.9	<i>A 2</i>
59.1	40	8.0	9.0	<i>K 0</i>
57.7	57	8.5	9.5	"
58.5	31	8.6	9.6	"
58.7	47	8.6	9.6	"
58.3	23	8.0	9.2	<i>K 5</i>

TAB. B.

n	Sp.
1	<i>B 3</i>
2	<i>B 5</i>
1	<i>B 8</i>
4	<i>B 9</i>
6	<i>A 0</i>
1	<i>A 5</i>
3	<i>A</i>
5	<i>F</i>
5	<i>G 5</i>

TAB. C (c = -1.1).

m'	9	10	11	12	13	> 13.5
n	8	7	8	9	23	40

N. G. C. 1807 (M-e 29).

A thin, irregular, distinct cl. Clusters with faint stars are usually more dense and concentrated than this one. Two bright stars lying in the cl., belong probably to the Taurus-cluster.

21.

Pl. 6.

$$\alpha = 5^h 4.^m 9$$

$$\delta = +16^\circ 24'$$

*GD*₆

F. A. C. 121

$$n = 4.0 \quad a = 29$$

I I *T* III

$$d = 18-21$$

$$n = 92 \quad n_A = 2$$

$$n_G = 2 \quad n_K = 1$$

TAB. A.

α	δ	m	m'	Sp.
$5^h 4.^m 7$	$+16^\circ 22'$	10.4	10.5	A 2
4.3	15	10.4	10.4	A
5.0	22	9.0	9.8	G 5
5.0	29	9.2	10.0	,
5.1	19	8.3	9.3	K 0

TAB. B.

n	Sp.	n	Sp.
1	B 8	2	F'
2	A 0	1	G 0
2	A 2	1	G 5
1	A 3	1	K 0
1	A 5	1	K 2

TAB. C (c = -1.1).

m'	9	10	11	12	13	> 13.5
n	1	5	6	8	20	52

N. G. C. 1817 (Not noted by Melotte).

Forms with *N. G. C. 1807* a double-cluster, and has the same appearance as this one; the diameter is, however, almost twice as large as that of 1807. Melotte has quite overlooked this cl.

22.

Pl. 6.

$$\alpha = 5^h 6.^m 3$$

$$\delta = +16^\circ 34'$$

*GD*₆

F. A. C. 121

$$\bar{n} = 4.0 \quad a = 35$$

I II *T* III

$$d = 30-36$$

$$n = 144$$

$$n_A = 2 \quad n_G = 1$$

TAB. A.

α	δ	m	m'	Sp.
$5^h 5.^m 4$	$+16^\circ 28'$	9.7	9.7	A 0
6.4	34	9.7	9.8	A 2
6.1	38	8.7	9.5	G 5

TAB. B.

n	Sp.	n	Sp.
1	B	1	G 0
4	A 0	5	G 5
2	A 2	1	K 0
1	A 3	6	K 2
2	A 5	1	K 5
7	T		

TAB. C (c = -1.1).

m'	9	10	11	12	13	> 13.5
n	1	5	5	16	29	88

N. G. C. 1857 (M-e 32).

23.

Pl. 2.

$$\alpha = 5^h 13.^m 2$$

$$\delta = +39^\circ 14'$$

GC_5

F. A. C. 168

$$\bar{n} = 4.7 \quad a = 85$$

II TI

$$d = [8] \quad n = 28$$

A small, very thin cl. containing a few faint stars. The two brightest stars lying in the cl. do certainly not belong to it; in the vicinity are numerous bright stars.

TAB. A.

α	δ	m	m'	Sp.
$5^h 13.^m 0$ 13.2	$+39^\circ 16'$ 14	9.4 7.84	9.4 9.02	[A] [K 5]

TAB. B.

n	Sp.
1	A 0
3	F
1	K 5

TAB. C ($c = -0.9$).

m'	11	12	13	> 13.5
n	1	2	5	20

N. G. C. 1893 (M-e 33).

24.

Pl. 2.

$$\alpha = 5^h 19.^m 2$$

$$\delta = +33^\circ 18'$$

GD_5

F. A. C. 145

$$\bar{n} = 3.6 \quad a = 7.4$$

II TIV

$$d = 22-26$$

$$n = 34 \quad n_G = 1$$

May be counted as one of the most irregular cls. Rather thin. Not condensed and imperceptibly passing into the environs.

TAB. A.

α	δ	m	m'	Sp.
$5^h 19.^m 0$	$+33^\circ 17'$	9.5	10.1	G

TAB. B.

n	Sp.	n	Sp.
5	B	2	G 5
6	A	2	K
2	F		

TAB. C ($c = -1.1$).

m'	9	10	11	12	13	> 13.5
n	1	1	3	9	8	12

25.

Pl. 6.

$$\alpha = 5^h 21.^m 4$$

$$\delta = +35^\circ 14'$$

GC_5

F. A. C. 145

$$\bar{n} = 2.0 \quad a = 105$$

II TI

$$d = [6] \quad n = 20$$

N. G. C. 1907 (M-e 35).

A small cl. containing a few faint stars lying very condensed. Forms a pair with M. 38 (N. G. C. 1912). No stars in D. C.

TAB. C ($c = -1.1$).

m'	12	13	> 13.5
n	1	7	12

N. G. C. 1912. M. 38 (M-e 36).

A large, condensed cl., well defined.

26.

Pl. 6.

$$\alpha = 5^h 22.^m 0$$

$$\delta = +35^\circ 45'$$

GC_5

F. A. C. 145

$$\bar{n} = 2.8 \quad a = 111$$

I II T I

$$d = 40-47$$

$$n = 215 \quad n_A = 2$$

$$n_G = 1$$

TAB. A.

α	δ	m	m'	Sp.
$5^h 23.^m 2$	$+35^\circ 53'$	8.7	8.7	B 8
23.3	38	9.5	9.5	A
22.7	49	8.6	9.4	G 5

TAB. B.

n	Sp.	n	Sp.	n	Sp.
2	B 0	1	B p	4	F
1	B 1	6	A 0	1	G 0
2	B 5	3	A 2	1	G 5
3	B 8	1	A 5	11	K
2	B				

TAB. C ($c = -1.1$).

m'	8	9	10	11	12	13	> 13.5
n	1	2	7	11	24	45	125

N. G. C. 1960. M. 36 (M-e 37).

An almost circular cl. with very distinct condensation. The faint stars which are very few in number are mostly situated in the exterior parts. No stars in D. C.

27.

Pl. 3.

$$\alpha = 5^h 29.^m 5$$

$$\delta = +34^\circ 4'$$

GC_5

F. A. C. 145

$$\bar{n} = 4 \quad a = 114$$

I II T I

$$d = 22-27$$

$$n = 88$$

TAB. C ($c = -1.1$).

m'	9	10	11	12	13	> 13.5
n	2	8	9	13	21	35

N. G. C. 2099. M. 37 (M-e 38).

A dense, very regular, well condensed cl. with numerous faint stars. The majority of the bright stars lies near the centre. No stars in D. C.

28.

Pl. 7.

$$\alpha = 5^h 45.^m 8$$

$$\delta = +32^\circ 31'$$

GC_5

F. A. C. 146

$$\bar{n} = 4.4 \quad a = 64.5$$

I II T I

$$d = 34-41$$

$$n = 337$$

TAB. A.

α	δ	m	m'	Sp.
$5^h 47.^m 0$	$+32^\circ 16'$	9.0	9.0	[B 9]
45.7	31	Cl.	Cl.	Con.

TAB. B.

n	Sp.	n	Sp.
5	B 9	1	G
7	A	2	K
3	F	1	Ma

TAB. C ($c = -1.8$).

m'	11	12	13	> 13.5
n	20	103	149	65

N. G. C. 2126 (M-e 39).

29.

Pl. 3.

$$\alpha = 5^h 55.^m 2$$

$$\delta = +49^\circ 54'$$

GC_5

F. A. C. 168

$$\bar{n} = 2.2 \quad a = 116$$

I II T III

$$d = [6] \quad n = 25$$

$$n_A = 1?$$

A rather thin, well defined cl. containing a small number of faint stars. It is clearly oval, contrary to other small clusters. Falls along a bright star B. D. $+48^\circ.1333$. No stars in D. C.

TAB. A.

α	δ	m	m'	Sp.
$5^h 55.^m 0$	$+49^\circ 55'$	5.98	5.98	[A 0]

TAB. B.

n	Sp.
1	B 9

TAB. C ($c = -0.9$).

m'	12	13	> 13.5
n	4	7	14

N. G. C. 2158 (M-e 40).

30.

$$\alpha = 6^h 1.^m 3$$

$$\delta = +24^\circ 6'$$

GC_6

F. A. C. 146

Not distinctly shown on the chart. Possibly of the globular class.

N. G. C. 2168. *M. 35* (M-e 41).

31.

Pl. 7.

$$\alpha = 6^h 2.^m 7$$

$$\delta = +24^\circ 21'$$

GC_6

F. A. C. 146

$$\bar{n} = 3.1$$

$$a = 82$$

I II T I

$$d = 45-55$$

$$n = 215 \quad n_A = 6$$

$$n_G = 1$$

A splendid specimen. A very large, thin and circular cl., without sharply conspicuous condensation. On the contrary, the centre seems to be rather void of stars. In the vicinity of the centre is a gathering of five or six stars which are not to be clearly distinguished. The cl. passes imperceptibly into the environs.

TAB. A.

α	δ	m	m'	Sp.
$6^h 2.^m 9$	$+24^\circ 22'$	8.6	8.6	B 8
4.4	34	9.5	9.5	B 9
3.3	35	8.6	8.6	[A 0]
3.7	14	8.5	8.6	A 2
3.6	10	10.0	10.1	,
3.8	38	9.4	9.4	A
3.2	38	10.0	10.0	,
3.2	27	8.2	8.8	G 0

TAB. B.

n	Sp.	n	Sp.
1	B 1	2	A
1	B 8	3	F
7	B 9	1	G 0
9	A 0	5	G 5
1	A 2	11	K
1	A 3	1	Ma
1	A 5		

TAB. C ($c = -1.8$).

m'	8	9	10	11	12	> 12.5
n	4	21	39	38	37	76

32.

$$\alpha = 6^h 8.^m 2$$

$$\delta = + 39^\circ 53'$$

GC_5

F. A. C. 169

N. G. C. 2192 (M-e 42).

This cl. is not distinctly shown on the chart.

33.

Pl. 3.

$$\alpha = 6^h 8.^m 2$$

$$\delta = + 12^\circ 50'$$

GD_6

F. A. C. 122

$$\bar{n} = 6.4 \quad a = 41$$

I II T I

$$d = [6] \quad n = 51$$

N. G. C. 2194 (M-e 43).

A small, circular, dense cl. containing exclusively faint stars.

No stars in D. C.

TAB. C (c = - 1.4).

m'	12	13	> 13.5
n	1	8	42

34.

Pl. 3.

$$\alpha = 6^h 11.^m 3$$

$$\delta = - 18^\circ 37'$$

GD_7

F. A. C. 74

$$\bar{n} = 7.5 \quad a = 69$$

I II T I

$$d = 19-23$$

$$n = 71 \quad n_G = 1$$

$$n_K = 1$$

N. G. C. 2204 (M-e 44).

A distinct cl., circular and well condensed.

TAB. A.

α	δ	m	m'	Sp.
$6^h 11.^m 1$	$- 18^\circ 35'$	9.0	9.8	$G 5$
11.0	27	6.24	7.24	$K 0$

TAB. B.

n	Sp.	n	Sp.
1	$B 9$	3	F
5	A	1	K

35.

Pl. 4.

$$\alpha = 6^h 16.^m 0$$

$$\delta = - 7^\circ 15'$$

GD_7

F. A. C. 74

$$\bar{n} = 7.0 \quad a = 128$$

I II T I

$$d = [9] \quad n = 28$$

N. G. C. 2215 (M-e 45).

A very well defined cl. with equal dispersion. No stars in D. C.

36.

$$\alpha = 6^h 25.^m 7$$

$$\delta = - 31^\circ 13'$$

GD_7

F. A. C. 50

N. G. C. 2243 (M-e 46).

Not distinctly shown on the chart. Possibly a globular cl.

37.

$$\alpha = 6^h 33.^m 0$$

$$\delta = + 10^\circ 58'$$

GC_6

F. A. C. 123

N. G. C. 2259 (M-e 48).

Not shown on the chart.

N. G. C. 2266 (M-e 50).

38.

Pl. 4.

A small, rather dense, very distinct cl. with faint stars. No stars in D. C.

$$\alpha = 6^h 37.^m 0$$

$$\delta = + 27^\circ 4'$$

GC_6

F. A. C. 147

$$\bar{n} = 4.7 \quad a = 85$$

III T I

$$d = [7] \quad n = 110$$

TAB. C (c = -0.9).

m'	11	12	13	> 13.5
n	4	9	42	55

N. G. C. 2281 (M-e 51).

39.

Pl. 8.

A thin, peculiarly formed cl. containing mainly bright stars. Particularly faint stars are not numerous. Its outlines are very irregular. The densest part lies, contrary to the rule, in one of the outsides. Four of the brightest stars lie so close to each other that they partially cover one another. It is therefore difficult to determine their magnitudes. No stars in D. C.

$$\alpha = 6^h 42.^m 3$$

$$\delta = + 41^\circ 10'$$

GC_5

F. A. C. 169

$$\bar{n} = 3.2 \quad a = 55$$

III T III

$$d = 20-24$$

$$n = 62 \quad n_A = 3$$

TAB. A.

α	δ	m	m'	Sp.
$6^h 43.^m 0$	$+ 41^\circ 6'$	9.0	9.0	A 0
41.7	11	9.2	9.2	'
41.4	5	8.6	8.6	A

TAB. B.

n	Sp.
4	A
1	F
1	G
2	K

TAB. C (c = -0.8).

m'	9	10	11	12	13	> 13.5
n	5	5	8	5	7	32

40.

Pl. 8.

N. G. C. 2287. M. 14. (M-e 52).

A very large cl., sharply separated from the surroundings and consisting for a great part of bright stars. In the outsides the distribution of the stars is unequal.

$$\alpha = 6^h 42.^m 7$$

$$\delta = - 20^\circ 38'$$

GD_7
 F. A. C. 75
 $\bar{n} = 5.1$ $a = 104$
 I II T II
 $d = 40-48$
 $n = 159$ $n_A = 16$
 $n_F = 1$ $n_K = 4$

TAB. A.

α	δ	m	m'	Sp.
$6^h 42.^m 8$	$-20^\circ 55'$	6.00	5.3	B 8
41.8	39	8.0	7.7	A 0
41.3	35	8.3	8.8	,
41.5	46	9.0	9.7	,
41.4	35	9.1	8.0	,
41.9	39	9.1	8.3	,
41.3	25	9.4	8.8	,
42.2	37	9.6	9.1	,
42.1	35	9.8	8.8	,
42.1	44	9.8	8.8	[,]
43.2	41	9.8	8.8	,
41.7	37	10.1	8.3	,
41.3	35	8.9	8.5	A
41.9	42	8.9	8.2	,
41.3	43	9.1	8.8	,
42.5	42	10.5	9.7	,
42.6	33	10.5	9.7	,
42.7	34	8.4	8.6	F 8
41.7	30	8.3	8.8	[K 0]
41.6	41	7.4	8.3	K 2
41.5	45	7.50	8.6	,
42.2	43	8.1	8.8	,
41.4	58	8.4	9.1	K 5

TAB. B.

n	Sp.
2	B 3
4	B 8
1	B 9
22	A 0
6	A 2
2	A 3
4	F 0
2	F 5
2	G 0
5	G 5
9	K 0
1	K 2
2	K 5
2	Mb
1	Mc

N. G. C. 2301 (M-e 54).

41.

Pl. 4.

$\alpha = 6^h 46.^m 6$
 $\delta = +0^\circ 35'$

GC_7

F. A. C. 99

$\bar{n} = 7.9$ $a = 47$

I II T III

$d = 17-21$

$n = 54$ $n_A = 3$

$n_K = 1$

This cl. presents a curious appearance. In the centre are to be found some bright stars which cannot be clearly distinguished. This centre is surrounded with a ring of faint stars, the diameter of which is about $5'$. From this ring emanate three offshoots containing brighter stars than those of the ring. A similar cl. seems not to exist.

TAB. A.

α	δ	m	m'	Sp.
$6^h 46.^m 5$	$+0^\circ 29'$	8.3	8.3	A 0
46.5	32	8.7	8.7	,
46.5	27	9.3	9.3	A
47.1	35	8.9	9.9	K 0

TAB. B.

n	Sp.	n	Sp.
5	B	3	F
2	A 0	1	K 2
1	A 2	1	K 5
1	A 5		

TAB. C ($c = -1.8$).

m'	8	9	10	11	12	> 12.5
n	2	4	6	8	11	23

42.

$\alpha = 6^h 49.^m 2$
 $\delta = +18^\circ 8'$

GC_6

F. A. C. 123

$\bar{n} = 8.5$ $a = 59$

I II T I

$d = [4]$ $n = 20$

N. G. C. 2304 (M-e 55).

A small, rather thin, distinct cl. with exclusively very faint stars.

TAB. C ($c = -0.9$).

m'	> 13.5
n	20

43.

$\alpha = 6^h 51.^m 2$
 $\delta = -7^\circ 4'$
*GD*₇
 F. A. C. 99
 $\bar{n} = 5.0$ $a = 111$
I II T I
 $d = [3]$ $n = 22$

N. G. C. 2309 (M-e 56).

A small, dense cl. with a few faint stars. No stars in D. C.

44.

$\alpha = 6^h 57.^m 1$
 $\delta = +75^\circ 23'$
*GC*₄
 F. A. C. 200

N. G. C. 2314 (M-e 57).

Not well shown on the chart.

45.

Pl. 9.
 $\alpha = 6^h 58.^m 2$
 $\delta = -8^\circ 12'$
*GC*₇
 F. A. C. 75
 $\bar{n} = 4.7$ $a = 100$
I II T III
 $d = 19-23$
 $n = 150$ $n_A = 7$
 $n_K = 2$

N. G. C. 2323. M. 50 (M-e 58).

A very distinct cl. with irregular outline and a clear condensation. The bulk of the bright stars lies in the centre. The dispersion in the outsides is very unequal.

TAB. A.

α	δ	m	m'	Sp.
$6^h 58.^m 1$	$-8^\circ 2'$	8.9	8.9	B 8
58.1	10	9.0	9.0	,
58.2	12	8.4	8.4	B 9
57.9	18	9.2	9.2	,
58.7	19	9.1	9.1	A 0
59.0	7	9.8	9.8	,
58.5	22	9.1	9.1	A
59.8	18	7.41	8.41	K 0
58.0	19	7.8	8.9	K 2

TAB. B.

n	Sp.
1	B 2
4	B 8
2	B 9
5	A 0
1	A 3
3	F
1	G 5
1	K 0
1	K 5
1	O e 5

N. G. C. 2324 (M-e 59).

A rather dense, distinct, condensed and regular cl. At the outer edge are to be found five or six bright stars which may possibly belong to the cl. The discontinuity in magnitude between these stars and the others is, however, so great that they may perhaps not be counted as belonging to the cl.

46.

Pl. 4.
 $\alpha = 6^h 59.^m 0$
 $\delta = +1^\circ 12'$
*GC*₇
 F. A. C. 99
 $\bar{n} = 8.0$ $a = 16$
I I T I
 $d = 13-15$
 $n = 44$ $n_A = 1$

TAB. A.

α	δ	m	m'	Sp.
$6^h 59.^m 1$	$+1^\circ 14'$	9.6	9.6	A 0

TAB. B.

n	Sp.	n	Sp.
1	B 9	1	A 3
3	A 0	2	F
1	A 2	1	G 0

TAB. C ($c = -1.8$).

m'	12	13	> 13.5
n	5	12	27

N. G. C. 2335 (M-e 60).

47.

Pl. 5.

$$\alpha = 7^h 1.^m 8$$

$$\delta = -9^\circ 56'$$

GC_7

F. A. C. 75

$$\bar{n} = 3.2 \quad a = 75$$

I II *T* IV

$$d = 19-23$$

$$n = 34 \quad n_{.1} = 1$$

$$n_K = 1$$

A not well defined cl. which contains faint stars and imperceptibly passes into the surroundings. No condensation; the outline rather irregular. No stars in D. C.

TAB. A.

α	δ	m	m'	Sp.
$7^h 1.^m 4$ 1.7	$-10^\circ 1'$ 4	7.96 7.96	7.94 9.03	<i>B</i> 9 <i>K</i> 2

TAB. B.

n	Sp.	n	Sp.
1	<i>B</i> 0	2	<i>F</i>
1	<i>B</i> 3	1	<i>G</i> 5
1	<i>B</i> 5	5	<i>K</i> 0
1	<i>B</i> 8	1	<i>K</i> 2
7	<i>A</i>	1	<i>K</i> 5

N. G. C. 2345 (M-e 61).

48.

Pl. 5.

$$\alpha = 7^h 3.^m 7$$

$$\delta = -13^\circ 1'$$

GD_7

F. A. C. 75

$$\bar{n} = 7.3 \quad a = 31$$

I II *T* I

$$d = [12] \quad n = 38$$

$$n_A = 1 \quad n_G = 1$$

A not well defined cl. containing mainly faint stars. No condensation. The form oval.

TAB. A.

α	δ	m	m'	Sp.
$7^h 3.^m 6$ 3.9	$-13^\circ 6'$ 12 56	9.2 8.5	9.3 9.3	<i>A</i> 2 <i>G</i> 5

TAB. B.

n	Sp.
2	<i>B</i> 9
2	<i>A</i> 0
1	<i>G</i> 5
1	<i>K</i> 0

N. G. C. 2353 (M-e 62).

49.

Pl. 6.

$$\alpha = 7^h 9.^m 8$$

$$\delta = -10^\circ 8'$$

GC_7

F. A. C. 75

$$\bar{n} = 5.5 \quad a = 81$$

I II *T* III

$$d = 26-31$$

$$n = 78$$

$$n_B = 2$$

$$n_A = 6$$

$$n_F = 1$$

$$n_K = 1$$

A very thin, irregular cl. with the condensation in one of the outsides.

TAB. A.

α	δ	m	m'	Sp.
$7^h 9.^m 7$ 9.1 9.4 9.6 9.9 9.2 10.3 10.7 9.8 9.2 10.2	$-10^\circ 8'$ 3 16 2 2 9 58 10 20 14 6 16 0	5.99 9.3 9.5 9.5 9.2 9.5 10.1 9.7 8.36 8.0 9.19	5.77 9.3 9.5 9.5 9.2 9.5 10.1 9.7 8.12 8.3 10.19	<i>B</i> 1 <i>B</i> 8 » » <i>B</i> 9 » [»] » <i>B</i> <i>F</i> 0 <i>K</i> 0

TAB. B.

n	Sp.
1	<i>B</i> 5
5	<i>B</i> 8
12	<i>B</i> 9
1	<i>B</i>
31	<i>A</i>
4	<i>F</i> 0
1	<i>F</i> 2
5	<i>F</i> 5
10	<i>G</i>
5	<i>K</i> 0
2	<i>K</i> 2
3	<i>K</i> 5

50.

Pl. 6.

$$\alpha = 7^h 11.^m 3$$

$$\delta = +13^\circ 57'$$

GC_6

F. A. C. 123

$$n = 4.6 \quad a = 46$$

I II *T* I

$$d = [10] \quad n = 77$$

A small, dense and circular cl. with faint stars. No stars in D. C.

TAB. C ($c = -0.9$).

m'	12	13	>13.5
n	3	5	69

N. G. C. 2360 (M-e 64).

A rather regular, well condensed cl. gradually passing into the environs. Contains mainly faint stars.

51.

Pl. 6.

$$\alpha = 7^h 13.^m 2$$

$$\delta = -15^\circ 27'$$

GD_7

F. A. C. 75

$$\bar{n} = 10.8 \quad a = 51$$

I II T I

$$d = 17-20$$

$$n = 174 \quad n_B = 1$$

TAB. A.

α	δ	m	m'	Sp.
$7^h 13.^m 6$	$-15^\circ 27'$	8.7	8.5	B 2

TAB. B.

n	Sp.	n	Sp.
1	B 8	6	A
3	B 9	2	G 0

N. G. C. 2362 (M-e 65).

Falls on Canis Majoris. Contains several bright stars. Differs scarcely from the surroundings, which also contain numerous bright stars. No stars in D. C.

52.

Pl. 6.

$$\alpha = 7^h 14.^m 6$$

$$\delta = -24^\circ 46'$$

GD_7

F. A. C. 51

$$\bar{n} = 9.2 \quad a = 87$$

I II T IV

$$d = [7] \quad n = 21$$

M-e 66 (Not in *N. G. C.*).

Shows a peculiar appearance: a circular cl. of faint stars surrounded by brighter stars unevenly distributed. Melotte's value of the diameter is quite too small, as evidently he has only considered the inner faint cl.

53.

Pl. 7.

$$\alpha = 7^h 23.^m 4$$

$$\delta = -47^\circ 32'$$

GC_7

F. A. C. 31

$$\bar{n} = 10.4 \quad a = 118$$

I II T II

$$d = 33-39$$

$$n = 127 \quad n_A = 2$$

$$n_K = 1$$

TAB. A.

α	δ	m	m'	Sp.
$7^h 22.^m 0$	$-47^\circ 22'$	9.1	9.4	A 0
24.5	35	7.9	8.2	A 5
23.3	34	7.8	8.4	K 0

TAB. B.

n	Sp.	n	Sp.
7	B	3	F
4	A 0	2	G
2	A	2	K 0

54.

Pl. 7.

$$\alpha = 7^h 31.^m 9$$

$$\delta = -20^\circ 23'$$

GC_7

F. A. C. 76

$$\bar{n} = 6.1 \quad a = 123$$

I II T III

$$d = [10] \quad n = 47$$

N. G. C. 2421 (M-e 67).

A small, well defined cl. with fairly clear condensation. The outsides are rather irregular. No stars in D. C.

N. G. C. 2422 (M-e 68).

55.
Pl. 9.
 $\alpha = 7^h 32.^m 0$
 $\delta = -14^\circ 16'$
 GC_7
F. A. C. 76
 $n = 7.6 \quad a = 92$
I II *T* III
 $d = 34-41$
 $n = 72 \quad n_B = 1$
 $n_A = 13 \quad n_K = 3$

A curious specimen; contains some very bright stars, which seem to be mingled in a dense gathering of relatively faint stars. Three bright stars are lying close together. Irregular form.

TAB. A.

α	δ	m	m'	Sp.
$7^h 31.^m 4$	$-14^\circ 16'$	5.57	5.45	B 5
33.1	13	6.42	6.40	B 9
31.9	23	7.7	7.7	"
32.0	16	7.9	7.9	"
32.0	16	7.9	7.9	"
32.1	14	7.9	7.9	"
31.4	29	8.5	8.5	"
32.0	2	9.1	9.1	["]
32.2	21	8.6	8.6	A 0
31.1	23	9.1	9.1	"
31.8	31	9.1	9.1	["]
32.0	27	9.1	9.1	"
31.8	22	9.8	9.8	"
31.8	23	9.8	9.8	["]
31.1	6	9.6	9.7	A 2
31.0	14	10.1	10.2	"
31.8	17	9.1	9.1	A
32.0	12	9.2	9.2	"
31.9	14	10.1	11.1	K 0
31.6	29	8.5	9.5	"
31.6	11	8.6	9.7	K 2

TAB. B.

n	Sp.
1	B 2
1	B 5
1	B 8
9	B 9
2	B
30	A 0
11	A 2
2	A 3
2	A
10	F
7	G
7	K 0
5	K 2
3	K 5
1	K
2	Ma

N. G. C. 2420 (M-e 69).

56.
Pl. 7.
 $\alpha = 7^h 32.^m 5$
 $\delta = +21^\circ 48'$
 GC_6
F. A. C. 124
 $\bar{n} = 2.4 \quad a = 137$
I III *T* I
 $d = [6] \quad n = 42$

A small, dense, distinct and circular cl., with faint stars. May be referred to the globular clusters. No stars in D. C.

TAB. C ($c = -0.5$).

m'	11	12	13	> 13.5
n	2	4	6	30

N. G. C. 2423 (M-e 70).

57.
Pl. 9.
 $\alpha = 7^h 32.^m 5$
 $\delta = -13^\circ 38'$
 GC_7
F. A. C. 76
 $\bar{n} = 5.5 \quad a = 91$
I II *T* III
 $d = 27-33$
 $n = 92 \quad n_A = 2$
 $n_K = 1$

A very thin, not well defined cl. consisting of faint stars. Rather irregular outline; no condensation; the stars unequally dispersed. This cl. borders upon *N. G. C. 2422*.

TAB. A.

α	δ	m	m'	Sp.
$7^h 32.^m 2$	$-13^\circ 47'$	9.1	9.1	B 9
32.5	39	9.1	9.1	A 0
32.0	50	9.1	10.1	K 0

TAB. B.

n	Sp.	n	Sp.	n	Sp.
1	B 2	19	A 0	5	K 0
1	B 3	5	A 2	2	K 2
2	B 5	3	A	3	K 5
1	B 8	3	F	1	K
12	B 9	2	G 5	1	Ma
1	B				

M-e 71 (Not in N. G. C.)

58.

Pl. 7.

$$\alpha = 7^h 32.^m 9$$

$$\delta = -11^\circ 50'$$

GC_7 F. A. C. 76

$$\bar{n} = 6.7 \quad a = 100$$

$I\ II \quad T\ II$

$$d = 13-16$$

$$n = 58$$

A rather small and irregular cl., containing exclusively faint stars. Distinct condensation. No stars in D. C.

M-e 72 (Not in N. G. C.)

59.

$$\alpha = 7^h 33.^m 7$$

$$\delta = -10^\circ 27'$$

GC_7 F. A. C. 76

$$\bar{n} = 6.7 \quad a = 108$$

$I\ II \quad T\ II$

$$d = [5] \quad n = 16$$

Very small; irregular form; faint stars. Well defined. No stars in D. C.

60.

$$\alpha = 7^h 36.^m 5$$

$$\delta = -18^\circ 51'$$

GC_7 F. A. C. 76

N. G. C. 2432 (M-e 73).

This cl. is not shown on the chart.

N. G. C. 2439 (M-e 74).

61.

Pl. 7.

$$\alpha = 7^h 37.^m 0$$

$$\delta = -31^\circ 25'$$

GD_8 F. A. C. 52

$$\bar{n} = 6.3 \quad a = 66$$

$I\ II \quad T\ III$

$$d = [9] \quad n = 49$$

A very interesting specimen. The brightest stars are lying in a dense, sharply marked ring round the nearly starless centre. Outside the ring lie faint stars irregularly dispersed. No stars in D. C.

N. G. C. 2437. M. 46 (M-e 75).

62.

Pl. 9.

$$\alpha = 7^h 37.^m 2$$

$$\delta = -14^\circ 35'$$

GC_7 F. A. C. 76

$$\bar{n} = 6.1 \quad a = 73$$

$I\ II \quad T\ I$

$$d = 30-36$$

$$n = 255 \quad n_A = 3$$

$$n_F = 1$$

A very fine, circular cl., distinctly separated from the surroundings and mainly containing middlebright stars. The condensation not very conspicuous.

TAB. A.

α	δ	m	m'	Sp.
$7^h 36.^m 6$	$-14^\circ 37'$	9.0	9.0	$B\ 9$
36.8	35	8.5	8.5	$A\ 0$
37.3	45	8.99	8.99	[,]
38.3	37	9.1	9.2	$A\ 2$
36.5	49	8.7	9.0	$F\ 2$
37.2	29	<i>Neb.</i>	<i>Neb.</i>	<i>Pd</i>

TAB. B.

n	Sp.	n	Sp.
1	$B\ 2$	3	$F\ 0$
2	$B\ 9$	3	$F\ 2$
17	$A\ 0$	1	$F\ 5$
6	$A\ 2$	1	$F\ 8$
2	$A\ 3$	3	G
3	$A\ 5$	6	K
3	A	3	Ma

N. G. C. 2447. M. 93 (M-e 76).

This cl. is at the centre so strongly condensated that the stars can scarcely be separated. The density decreases rapidly. Rather irregular outline.

63.
Pl. 10.
 $\alpha = 7^h 40.^m 4$
 $\delta = -23^\circ 38'$
 GC_7 F. A. C. 52
 $\bar{n} = 5.2$ $a = 116$
I II *T* III
 $d = 29-35$
 $n = 186$
 $n_A = 2$ $n_K = 1$

TAB. A.

α	δ	m	m'	Sp.
$7^h 40.^m 3$	$-23^\circ 38'$	11.2	9.0	<i>B</i> 9
40.7	26	10.7	9.3	,
40.7	50	10.4	9.0	[<i>A</i> 0]
40.1	38	8.9	9.0	<i>K</i>

TAB. B.

n	Sp.	n	Sp.
7	<i>B</i> 9	8	<i>F</i>
7	<i>B</i>	7	<i>G</i>
18	<i>A</i> 0	16	<i>K</i>
12	<i>A</i>		

N. G. C. 2455 (M-e 77).

Not distinctly shown on the chart.

64.
 $\alpha = 7^h 44.^m 6$
 $\delta = -21^\circ 3'$
 GC_7 F. A. C. 76

N. G. C. 2477 (M-e 78).

A very fine, circular, well defined cl. with a strong condensation and a rapidly decreasing density outwards. Contains a very large number of stars, none of which are bright. At the centre the stars are lying so close that one is almost inclined to class the cl. among the »globulars». It is therefore difficult to count the stars lying in the centre. No stars in D. C.

65.
Pl. 10.
 $\alpha = 7^h 48.^m 7$
 $\delta = -38^\circ 17'$
 GD_8 F. A. C. 32
 $\bar{n} = 3.5$ $a = 100$
I II *T* I
 $d = 28-34$
 $n = 253$

N. G. C. 2489 (M-e 79).

A well defined, circular cl. including only faint stars. Exceptionally thin as containing so faint stars. No stars in D. C.

66.
Pl. 8.
 $\alpha = 7^h 52.^m 2$
 $\delta = -29^\circ 48'$
 GC_8 F. A. C. 52
 $\bar{n} = 7.2$ $a = 19$
I I *T* I
 $d = [7]$ $n = 67$

N. G. C. 2506 (M-e 80).

A rather small, very dense and well defined cl. containing for the most part very faint stars. Almost of the globular class. No stars in D. C.

67.
Pl. 8.
 $\alpha = 7^h 55.^m 2$
 $\delta = -10^\circ 21'$
 GC_7 F. A. C. 76
 $\bar{n} = 4.4$ $a = 65$
I II *T* III
 $d = 15-18$
 $n = 56$

N. G. C. 2509 (M-e 81).

68.

$\alpha = 7^h 56.^m 3$
 $\delta = -18^\circ 48'$
*GC*₇ F. A. C. 76
 $\bar{n} = 8.2$ $a = 58$
I II *T* I
 $d = [5]$ $n = 56$

A small, well defined cl. with clear condensation and exclusively faint stars. Regular outline. The diameter is no doubt much greater than the estimate of Melotte. No stars in D. C.

N. G. C. 2516 (M-e 82).

69.

Pl. 26.
 $\alpha = 7^h 56.^m 7$
 $\delta = -60^\circ 36'$
*GD*₉ F. A. C. 16
 $\bar{n} = 2.5$ $a = 10$
I I *T* III
 $d = 93-111$
 $n = 703$ $n_B = 1$
 $n_A = 28$ $n_F = 1$
 $n_M = 1$

A very large, thin, irregular, well defined cl. containing a very great number of stars, many of which are very bright. The condensation is conspicuous, but the dispersion unequal.

TAB. A.

α	δ	m	m'	Sp.	α	δ	m	m'	Sp.
$7^h 57.^m 2$	$-60^\circ 33'$	5.88	5.71	<i>B</i> 3	$7^h 54.^m 7$	$-60^\circ 32'$	8.8	9.0	<i>A</i> 0
57.9	59 56	6.41	6.0	<i>B</i> 8	56.0	47	8.8	8.8	,
56.7	60 35	7.4	6.7	,	59.9	14	8.8	8.7	,
8 2.0	37	8.1	8.0	,	55.5	37	8.9	9.6	,
7 56.3	20	8.2	7.7	,	59.3	61 18	8.9	8.8	[,]
56.1	20	8.4	8.1	,	58.4	60 30	9.0	8.2	,
54.6	50	7.0	6.9	<i>B</i> 9	53.7	3	9.1	9.0	,
56.1	39	7.4	6.7	,	53.7	35	9.1	9.1	[,]
55.7	30	7.6	7.8	,	54.8	61 1	9.3	9.3	[,]
58.2	28	8.5	7.8	[,]	59.6	5	9.4	9.4	,
51.6	40	8.6	8.2	,	54.3	59 58	9.42	8.4	,
57.0	26	8.9	7.6	[,]	8 1.7	60 14	8.7	8.7	[<i>A</i> 2]
59.4	61 15	7.7	7.7	<i>A</i> 0	7 54.1	12	9.16	8.7	[,]
51.9	60 48	7.9	7.7	,	8 0.0	61 8	8.7	9.1	<i>A</i> 3
54.2	54	8.0	8.1	,	7 57.8	60 31	9.1	9.1	<i>A</i>
57.1	22	8.1	8.1	[,]	57.5	61 18	7.2	7.8	[<i>F</i> 0]
57.7	32	8.1	8.1	,	55.9	60 2	5.66	6.6	[<i>F</i> 8]
59.4	39	8.3	8.4	,	8 1.2	59 56	8.7	10.8	,
53.4	17	8.5	8.4	,	7 54.6	60 15	5.59	7.7	[<i>K</i> 2]
57.5	19	8.56	8.1	,	52.2	19	7.3	9.0	[<i>K</i> 5]
8 0.3	48	8.6	9.0	,	57.9	19	5.06	7.4	<i>Ma</i>
7 55.8	22	8.7	8.7	,					

A 0

m	n	m	n	m	n
7.1	1	8.4	2	9.3	5
7.2	2	8.5	4	9.4	1
7.4	4	8.6	2	9.5	3
7.7	2	8.7	4	9.6	6
7.8	1	8.8	2	9.8	3
7.9	2	8.9	9	9.9	3
8.0	2	9.0	3	10.1	3
8.1	2	9.1	8	10.2	1
8.2	4				

B 9

m	n	m	n
6.3	1	7.7	2
6.6	2	7.8	1
6.7	1	8.0	2
7.0	2	8.3	2
7.1	2	8.4	4
7.2	2	8.7	4
7.4	2	8.8	4
7.6	1	8.9	2

TAB. B.

<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.
4	<i>B</i> 3	79	<i>A</i> 0	31	<i>F</i> 0	39	<i>G</i> 0
1	<i>B</i> 5	28	<i>A</i> 2	9	<i>F</i> 2	50	<i>K</i> 0
7	<i>B</i> 8	4	<i>A</i> 3	27	<i>F</i> 5	12	<i>K</i> 2
34	<i>B</i> 9	3	<i>A</i> 5	12	<i>F</i> 8	24	<i>K</i> 5
1	<i>B</i>	12	<i>A</i>	1	<i>F</i>	5	<i>Ma</i>

N. G. C. 2539 (M-e 83).

A particularly fine example. There is scarcely any other cl. with so faint stars in which they lie so thinly dispersed as here. May perhaps be considered as a cl. rather neighbouring, containing exclusively dwarfs. Well defined, and regular outline.

70.

Pl. 11.

$$\alpha = 8^h 6.^m 0$$

$$\delta = -12^\circ 32'$$

*GC*₇ F. A. C. 76

$$\bar{n} = 6.8 \quad a = 46$$

I I *T* II

$$d = 27-33$$

$$n = 118 \quad n_A = 1$$

TAB. A.

α	δ	<i>m</i>	<i>m'</i>	Sp.
8 ^h 6. ^m ₅	-12° 38'	9.2	9.3	<i>A</i> 2
6.6	37	4.68	5.68	[<i>K</i> 0]

TAB. B.

<i>n</i>	Sp.	<i>n</i>	Sp.
1	<i>B</i> 9	1	<i>A</i>
7	<i>A</i> 0	5	<i>F</i>
2	<i>A</i> 2	3	<i>G</i>
1	<i>A</i> 5	3	<i>K</i> 0

N. G. C. 2547 (M-e 84).

A very thin, irregular cl. containing a small number of rather bright stars which are lying in a ring round the centre which is almost devoid of stars. In the environs are numerous bright stars.

71.

Pl. 11.

$$\alpha = 8^h 7.^m 7$$

$$\delta = -48^\circ 58'$$

*GD*₈ F. A. C. 32

$$\bar{n} = 6.5 \quad a = 65$$

I I *T* III

$$d = 22-27$$

$$n = 30 \quad n_F = 6$$

$$n_B = 1 \quad n_A = 6$$

TAB. A.

α	δ	<i>m</i>	<i>m'</i>	Sp.
8 ^h 7. ^m ₄	-48° 56'	6.68	6.2	<i>B</i> 3
8.0	59	8.2	8.0	<i>B</i> 8
7.2	58	9.0	8.0	,
7.5	52	8.3	7.6	<i>B</i> 9
7.0	58	8.9	8.0	,
7.0	49 2	9.6	8.4	,
7.5	48 48	9.6	9.3	[,]
7.0	50	9.4	9.0	[<i>A</i> 0]
8.4	54	10.9	9.8	<i>A</i> 2
7.8	49	10.9	10.1	<i>F</i> 0

TAB. B.

<i>n</i>	Sp.
1	<i>B</i> 3
1	<i>B</i> 8
8	<i>B</i> 9
12	<i>A</i> 0
2	<i>A</i> 2
1	<i>A</i> 5
1	<i>A</i>
3	<i>F</i> 0
1	<i>F</i> 2
3	<i>G</i>
1	<i>M</i> 0

N. G. C. 2548 (M-e 85).

A large, fine, very well defined cl. with mainly bright stars. Irregular outline and unequal distribution of the stars. At the centre are gathered about ten bright stars. The outsides are thin.

72.

Pl. 12.

$$\alpha = 8^h 8.^m 8$$

$$\delta = -5^\circ 30'$$

GC_7

F. A. C. 100

$\bar{n} = 4.0$ $a = 89$

I II T III

$d = 49-59$

$n = 188$ $n_A = 15$

$n_F = 1$ $n_K = 1$

TAB. A.

α	δ	m	m'	Sp.
8 ^h 8. ^m ₆	— 5° 46'	10.2	10.2	B 9
8.4	16	8.50	8.50	A 0
8.3	20	8.7	8.7	,
8.0	16	9.30	9.30	,
9.3	51	9.5	9.5	,
8.1	35	9.9	9.9	,
7.4	11	9.9	9.9	,
8.8	19	8.7	8.8	A 2
8.2	20	9.2	9.3	,
9.3	25	9.2	9.3	,
8.1	27	9.3	9.4	[,]
8.9	24	9.7	9.8	,
9.8	9	9.7	9.8	,
9.8	30	10.2	10.3	,
7.3	16	10.3	10.4	,
8.8	31	9.2	9.2	A
9.2	16	9.3	9.7	F 5
10.0	14	9.25	10.03	[G 5]
9.3	36	8.5	9.5	[K 0]
7.7	23	9.7	10.7	,

TAB. B.

n	Sp.
6	A 0
10	A 2
2	A 5
1	A
2	F
14	G
11	K 0
3	K 2
2	K 5
1	Ma

N. G. C. 2567 (M-e 86).

73.

Pl. 8.

$\alpha = 8^h 14.^m 6$

$\delta = - 30^\circ 20'$

GC_8 F. A. C. 52

$\bar{n} = 10$ $a = 54$

I I T III

$d = [12]$ $n = 58$

A rather distinct, irregular cl. with very unequal dispersion; at the centre the stars form several groups. No stars in D. C.

N. G. C. 2627 (M-e 87).

74.

Pl. 8.

$\alpha = 8^h 33.^m 1$

$\delta = - 29^\circ 36'$

GC_8 F. A. C. 53

$\bar{n} = 5.8$ $a = 80$

I II T I

$d = [12]$ $n = 36$

$n_K = 2$

A well defined cl. with regular outlines and exclusively faint stars.

TAB. A.

α	δ	m	m'	Sp.
8 ^h 33. ^m ₆	— 29° 34'	8.4	9.5	K 2
33.0	30	9.3	9.8	,

TAB. B.

n	Sp.	n	Sp.
1	B	1	G
6	A	1	K 2
1	F	2	K 5

N. G. C. 2632. M. 44 Praesepe (M-e 88).

75.

Pl. 12.

$\alpha = 8^h 34.^m 3$

$\delta = + 20^\circ 20'$

A very large, thin cl. without distinct condensation. The brightest stars are mainly situated in the central part of the cl., which shows a considerable difference between d_δ and d_α ($d_\delta > d_\alpha$).

GB_5

F. A. C. 125

$\bar{n} = 1.8$ $a = 116$

I II T III

$d = 2^\circ 8' - 2^\circ 34'$

$n = 174$ $n_A = 32$

$n_F = 13$ $n_G = 3$

$n_K = 2$ $n_M = 1$

TAB. A.

α	δ	m	m'	Sp.	α	δ	m	m'	Sp.
$8^h 34.^m_4$	$+ 20^\circ 20'$	6.52	6.52	A 0	$8^h 34.^m_2$	$+ 20^\circ 32'$	9.5	9.6	A 5
34.2	19 55	6.94	6.94	"	34.2	23	9.6	9.6	A
34.2	54	7.15	7.15	"	34.0	9	6.68	6.96	F 0
34.6	53	7.40	7.40	"	34.6	19 43	6.85	7.13	"
31.9	20 6	8.3	8.3	"	33.4	20 2	8.1	8.4	"
31.1	19 15	8.52	8.52	"	31.8	22	9.1	9.4	"
33.4	57	8.58	8.58	"	33.5	19 18	9.1	9.4	["]
34.6	20 3	8.7	8.7	"	34.1	20 55	9.2	9.5	"
34.7	12	8.7	8.7	["]	36.2	32	9.2	9.5	"
34.7	33	9.1	9.1	"	35.4	11	9.5	9.8	"
34.7	19 54	6.32	6.38	A 2	36.6	32	9.5	9.8	"
35.5	20 50	6.60	6.66	"	37.1	21 11	9.6	9.9	"
31.9	19 53	8.20	8.26	"	36.2	19 17	9.8	10.1	[F 2]
31.6	13	8.48	8.54	"	32.6	20 34	8.1	8.5	F 5
33.3	20 22	8.7	8.8	"	34.3	19 34	9.3	9.7	"
35.1	38	8.9	9.0	"	33.3	20 28	9.5	9.9	"
35.2	18	9.5	9.6	"	34.3	21 26	9.9	10.3	["]
35.2	19 56	6.75	6.83	A 3	31.7	20 50	8.1	8.6	F 8
34.0	38	7.8	7.9	"	31.3	19 57	9.9	10.4	["]
36.4	46	7.90	7.98	"	34.6	20 1	6.40	7.18	G 5
34.0	20 27	8.1	8.2	"	32.8	13	9.6	10.4	"
35.6	19 37	8.6	8.7	"	34.6	21 12	9.9	10.7	"
35.5	20 17	8.8	8.9	"	34.3	20 30	10.1	10.9	["]
34.3	19 18	9.8	9.9	"	34.4	22	6.48	7.48	[K 0]
32.1	38	6.70	6.84	A 5	34.1	19 54	6.68	7.68	["]
35.0	20 5	6.72	6.86	"	36.1	20 14	6.98	7.98	"
34.9	19 34	8.0	8.1	"	33.3	21 9	8.8	9.8	["]
36.5	17	8.00	8.14	["]	35.9	20 1	8.9	9.9	["]
32.9	20 21	8.6	8.7	"	33.8	32	9.5	10.5	["]
33.1	19 51	8.85	8.99	"	33.6	24	9.6	10.6	["]
35.9	30	8.9	9.0	"	33.2	21 9	10.1	11.1	"
34.8	33	9.1	9.2	"	34.6	29	10.1	11.5	Ma

TAB. B. *

n	Sp.	n	Sp.	n	Sp.
6	A 0	3	F 5	1	K 2
5	A 2	12	F 8	1	K 5
5	A 5	6	G 0	1	Ma
4	F 0	5	G 5	3	Mb
3	F 2	17	K 0	1	Mc

TAB. C ($c = -1.1$).

m'	6	7	8	9	10	11	12	13	> 13.5
n	1	7	19	19	14	15	17	23	59

76.

$\alpha = 8^h 34.^m_5$

$\delta = -34^\circ 25'$

GC_8 F. A. C. 53

N. G. C. 2635 (M-e 89).

This cl. is not clearly shown on the chart.

77.

Pl. 9.

$\alpha = 8^h 39.^m_4$

N. G. C. 2658 (M-e 90).

A rather thin, not well defined cl. Seems to consist of a circular centre with several offshoots. The cl. appears very indistinct on the chart.

* In this case the area for Tab. B is only three times as large as the clusterarea.

$\delta = -32^{\circ}18'$
 GC_8 F. A. C. 53
 $\bar{n} = 3.9$ $a = 6.8$
 $I\ II$ $T\ III$
 $d = [9]$ $n = 32$
 $n_F = 1$

TAB. A.

α	δ	m	m'	Sp.
$8^h 38.^m 9$	$-32^{\circ}18'$	10.8	10.1	F 8

TAB. B.

n	Sp.	n	Sp.
1	B	1	F 2
3	A	2	K

N. G. C. 2659 (M-e 91).

A very thin, not well defined cl. with very irregular outline.

78.

Pl. 9.

$\alpha = 8^h 39.^m 2$
 $\delta = -44^{\circ}36'$
 GD_8 F. A. C. 33
 $\bar{n} = 6.7$ $a = 9.9$
 $I\ II$ $T\ IV$
 $d = [12]$ $n = 36$
 $n_A = 1$

TAB. A.

α	δ	m	m'	Sp.
$8^h 38.^m 2$	$-44^{\circ}38'$	7.3	7.0	B 9

TAB. B.

n	Sp.	n	Sp.
1	B 2	1	G
1	A 0	4	K

79 (Not in *N. G. C.* and M-e).

A very irregular cl., containing exclusively bright stars.

79.

Pl. 13.

$\alpha = 8^h 38.^m 0$
 $\delta = -47^{\circ}58'$
 GD_8 F. A. C. 33
 $\bar{n} = 7.2$ $a = 10.6$
 $I\ II$ $T\ III$
 $d = 25-30$ $n = 37$
 $n_B = 1$ $n_A = 1$
 $n_K = 1$

TAB. A.

α	δ	m	m'	Sp.
$8^h 37.^m 7$	$-47^{\circ}52'$	7.3	7.0	B 5
38.9	53	8.3	7.6	B 8
37.8	48 0	10.0	8.8	[A 0]
37.0	5	7.8	9.0	K 0

TAB. B.

n	Sp.	n	Sp.	n	Sp.
1	B 3	4	A 2	1	G
2	B 5	1	A 3	4	K 0
9	B 8	1	A 5	3	K 2
12	B 9	3	F	1	K 5
10	A 0				

N. G. C. 2670 (M-e 93).

A very well defined and irregular cl. with mainly rather faint stars; rather thin at the outsides. The centre is dense.

Remark: In the vicinity of this cl. lies a group of bright stars ($\alpha = 8^h 38.^m 0$; $\delta = -47^{\circ}58'$) reminding of *N. G. C. 2547* which has not been noted by Melotte whose description of *N. G. C. 2670* is more applicable to this one. This cl. is described above.

TAB. A.

α	δ	m	m'	Sp.
$8^h 43.^m 5$	$-48^{\circ}23'$	8.5	8.0	[A 0]

TAB. B.

n	Sp.	n	Sp.	n	Sp.
2	B	1	A 3	2	G
1	A 0	1	F	5	K
1	A 2				

N. G. C. 2682. M. 67 (M-e 94).

A fine cl. with equal dispersion; almost circular and rather dense. Curious position of the brightest stars: they are lying mainly along a diameter of the cl.; the faint stars are lying on both sides of this diameter. Well defined from the surroundings which are very thin.

81.

Pl. 13.

$\alpha = 8^h 45.^m 8$
 $\delta = +12^{\circ}11'$
 GB_6 F. A. C. 125

$n = 2.3$ $a = 63$
 $I\ II$ $T\ I$
 $d = 25 - 30$
 $n = 190$ $n_K = 1$

TAB. A.

α	δ	m	m'	Sp.
$8^h 46.^m 4$	$+ 12^\circ 15'$	7.8	8.8	$K\ 0$

TAB. B.

n	Sp.
2	F
1	G

82.

N. G. C. 2818 (M-e 96).

$\alpha = 9^h 12.^m 0$
 $\delta = - 36^\circ 12'$
 GC_8 F. A. C. 53

Not distinctly shown on the
 chart. Classed as »globular» in
N. G. C.

TAB. C ($c = - 1$).

m'	8	9	10	11	12	13	> 13.5
n	1	1	4	10	15	36	123

83.

M-e 97. (Not in *N. G. C.*).

Pl. 10.
 $\alpha = 9^h 24.^m 1$
 $\delta = - 56^\circ 36'$
 GD_9 F. A. C. 17
 $\bar{n} = 10.5$ $a = 50$
 $I\ II$ $T\ III$
 $d = 39 - 47$
 $n = 74$ $n_A = 1$
 $n_K = 1$ $n_M = 1$

An irregular, for the greatest part thin cl.; yet ten stars
 are lying very close together.

TAB. A.

α	δ	m	m'	Sp.
$9^h 22.^m 5$	$- 56^\circ 55'$	8.2	7.4	$B\ 8$
23.0	49	8.3	9.5	$K\ 5$
24.9	53	7.9	8.9	Ma

TAB. B.

n	Sp.	n	Sp.	n	Sp.
2	$B\ 5$	4	F	3	$K\ 5$
3	$B\ 8$	5	G	1	K
6	$B\ 9$	9	$K\ 0$	2	Ma
22	A	6	$K\ 2$	1	Pd

N. G. C. 3114 (M-e 98).

84.
 Pl. 14.
 $\alpha = 9^h 59.^m 5$
 $\delta = - 59^\circ 38'$
 GD_9 F. A. C. 17
 $\bar{n} = 20.2$ $a = 44$
 $I\ II$ $T\ III$
 $d = 45 - 54$
 $n = 134$ $n_1 = 30$
 $n_F = 1$ $n_G = 2$
 $n_K = 5$ $n_N = 1$

A very large, thin, rather irregular cl. not sharply separated
 from the surroundings and without perceptible condensation.
 Contains many bright stars. These are lying in a circle round
 the centre which contains faint stars. The brightest star pre-
 sents a peculiar aspect: it is surrounded by a circle of faint
 stars which lie quite close to it.

TAB. A.

α	δ	m	m'	Sp.	α	δ	m	m'	Sp.
$9^h 58.^m 5$	$- 59^\circ 38'$	8.3	8.1	$B\ 9$	$10^h 2.^m 4$	$- 59^\circ 31'$	9.5	9.5	$[A\ 0]$
58.7	30	8.5	8.7	»	9 58.3	35	9.6	9.6	»
59.3	24	8.8	9.2	»	58.5	22	9.6	9.6	$[\]$
57.3	31	8.9	8.9	»	59.4	40	9.6	9.6	»
10 2.3	25	8.9	9.2	»	10 1.9	45	9.6	9.6	»
9 57.8	29	9.0	9.0	»	9 58.1	51	9.8	9.8	»
58.4	52	9.0	9.2	»	10 1.7	57	10.0	10.0	»
57.2	31	9.1	9.0	»	0.8	47	9.7	9.8	$A\ 2$
10 0.9	23	9.1	8.9	»	9 59.8	41	6.02	6.7	$[A\ 5]$
2.5	37	9.1	9.5	$[\]$	10 0.6	38	9.6	9.6	A
0.6	22	9.3	9.3	»	9 58.8	56	6.11	6.4	$[F\ 0]$
9 59.6	21	9.5	9.5	»	56.8	56	9.2	9.5	»
10 0.0	51	9.6	9.6	»	10 0.4	43	8.4	8.7	$G\ 5$
9 56.9	51	9.8	9.8	»	9 56.7	42	9.0	9.8	»
56.8	41	10.1	10.1	»	57.7	45	8.2	9.0	$K\ 0$
57.9	50	8.31	8.6	$A\ 0$	10 0.1	28	8.5	9.3	$[\]$
59.9	21	8.4	8.6	»	0.6	34	8.7	9.8	»
59.6	28	8.9	9.2	»	9 57.5	41	9.1	10.1	»
10 1.3	39	9.1	9.8	»	58.1	58	9.31	10.3	»
1.9	34	9.1	9.2	»	10 0.9	43	9.3	10.3	»
0.3	43	9.2	9.2	»	9 56.7	44	var.	var.	$Nb.$
9 59.0	41	9.5	9.5	»					
10 0.7	40	9.5	9.5	»					

TAB. B.

<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.
1	<i>B</i> 0	12	<i>B</i> 9	1	<i>A</i> 3	3	<i>F</i> 2	4	<i>G</i> 5	8	<i>M</i>
2	<i>B</i> 3	4	<i>B</i>	1	<i>A</i> 5	4	<i>F</i> 5	15	<i>K</i> 0	1	<i>Oa</i>
3	<i>B</i> 5	37	<i>A</i> 0	6	<i>A</i>	1	<i>F</i> 8	4	<i>K</i> 2		
17	<i>B</i> 8	9	<i>A</i> 2	12	<i>F</i> 0	7	<i>G</i> 0	12	<i>K</i> 5		

85.

$\alpha = 10^h 32.^m 0$
 $\delta = -57^\circ 43'$
*GC*₉ F. A. C. 18
 $\bar{n} = 16.1$ $\alpha = 88$
I III *T* II
 $d = [10]$ $n = 19$

N. G. C. 3293 (M-e 100).

A few bright stars forming a small cl., situated in a very rich region. No stars in D. C.

86.

Pl. 14.
 $\alpha = 10^h 38.^m 6$
 $\delta = -64^\circ 34'$
*GD*₉ F. A. C. 18
 $\bar{n} = 9.9$ $\alpha = 91$
I III *T* II
 $d = 30-36$
 $n = 102$

M-e 101 (Not in *N. G. C.*).

An irregular cl. with the centre rather condensed and the outsides thin. No stars in D. C.

87.

Pl. 14.
 $\alpha = 10^h 39.^m 4$
 $\delta = -63^\circ 52'$
*GD*₉ F. A. C. 18
 $\bar{n} = 12.9$ $\alpha = 83$
I II *T* I
 $d = 70-84$
 $n = 289$ $n_B = 8$
 $n_A = 11$ $n_G = 2$
 $n_K = 3$

M-e 102. (Not in *N. G. C.*).

A circular group, containing numerous very bright stars round Θ Carinæ. May be counted to Melotte's class II. (Melotte counts it to the coarse clusters, class IV).

TAB. A.

α	δ	<i>m</i>	<i>m'</i>	Sp.	α	δ	<i>m</i>	<i>m'</i>	Sp.
10 ^h 39. ^m 4	-63° 52'	3.03	2.79	<i>B</i> 0	10 ^h 39. ^m 9	-63° 33'	7.3	7.3	<i>A</i> 0
40.5	26	5.09	4.92	<i>B</i> 3	39.1	64 10	7.5	7.5	,
38.7	57	5.20	5.03	,	35.5	27	7.7	7.7	,
40.3	44	6.14	6.2	,	43.5	63 44	7.8	7.8	[,]
44.0	64 2	6.6	6.4	,	36.1	64 10	9.0	9.0	[,]
43.2	63 52	5.10	4.98	<i>B</i> 5	42.0	11	7.7	7.8	<i>A</i> 2
42.7	59	5.54	5.42	,	42.6	4	7.7	7.7	<i>A</i>
37.6	57	6.5	6.4	,	40.6	9	8.9	8.9	,
42.8	44	5.43	5.38	[<i>B</i> 8]	43.1	64 6	8.0	8.6	<i>G</i> 0
35.9	36	6.60	6.4	<i>B</i> 9	41.9	63 42	8.6	9.2	,
37.2	64 8	6.7	6.7	,	41.0	17	7.9	8.9	<i>K</i> 0
35.4	63 59	6.7	6.7	[,]	36.8	29	8.0	9.0	,
38.9	53	6.9	6.9	,	44.4	21	8.2	9.2	[,]
38.0	35	7.0	7.0	,	42.5	31	8.3	9.5	<i>K</i> 5
44.2	44	6.4	6.4	<i>A</i> 0					

TAB. B.

<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.
1	<i>B</i> 0	1	<i>B</i> 3 <i>p</i>	4	<i>A</i>	6	<i>F</i> 8	3	<i>K</i> 2
3	<i>B</i> 3	46	<i>A</i> 0	1	<i>A</i> 0 <i>p</i>	5	<i>G</i> 0	7	<i>K</i> 5
14	<i>B</i> 8	8	<i>A</i> 2	4	<i>F</i> 0	3	<i>G</i> 5	1	<i>M</i> b
16	<i>B</i> 9	9	<i>A</i> 3	3	<i>F</i> 2	1	<i>G</i>	1	<i>R</i> 5
1	<i>B</i>	9	<i>A</i> 5	9	<i>F</i> 5	10	<i>K</i> 0	1	<i>Oa</i>

88.

Pl. 15.

$\alpha = 11^h 2^m 2^s$

$\delta = -58^\circ 8'$

GC_9 , F. A. C. 18

$\bar{n} = 35$ $a = 32$

I II T I

$d = 60-72$

$n = 302$ $n_B = 3$

$n_A = 113$ $n_F = 0$

$n_G = 4$ $n_K = 4$

N. G. C. 3532 (M-e 103).

A very large, dense cl. with rather regular outline and distinct condensation. In this case the counting of the stars was very difficult. In the surroundings many dense groups are to be found. Owing to the great density of this cl. I have been able to count the stars only down to the 12th magnitude incl.

TAB. A.

α	δ	m	m'	Sp.	α	δ	m	m'	Sp.	α	δ	m	m'	Sp.
11 ^h 1 ^m 9 ^s	-58° 21'	8.4	8.3	[B 5]	11 ^h 1 ^m 0 ^s	-58° 8'	9.2	9.2	A 0	11 ^h 3 ^m 0 ^s	-57° 44'	9.6	9.7	A 2
2.0	18	8.0	8.0	B 8	0.9	57 52	9.4	9.4	"	3.6	45	9.8	9.9	"
1.5	18	8.3	8.3	"	2.2	59	9.4	9.4	"	2.0	47	9.9	10.0	"
6.0	57 58	8.8	8.8	"	2.8	55	9.4	9.4	"	2.1	53	9.9	10.0	"
1.6	58 17	8.9	8.9	"	2.9	51	9.4	9.4	"	2.8	58 6	9.9	10.0	"
0.6	1	9.0	8.2	[]	3.6	58 24	9.4	9.4	[]	4.5	10	9.9	10.0	[]
3.1	10	9.7	9.7	[]	10 58.8	57 40	9.5	9.5	"	5.4	1	10.1	10.2	"
2.9	10	8.2	8.2	B 9	11 3.3	56	9.5	9.5	"	1.5	25	10.2	10.3	"
10 59.6	14	8.5	7.6	"	3.6	56	9.5	9.5	[]	2.0	30	10.2	10.3	"
11 2.6	10	8.5	8.5	"	10 59.8	54	9.7	9.7	"	3.1	26	10.2	10.3	"
1.3	5	8.6	8.6	"	59.9	58 18	9.7	9.7	"	0.9	14	8.8	8.9	A 3
10 58.4	57 52	8.7	8.5	"	11 0.2	19	9.7	9.7	"	0.3	57 58	10.2	10.3	"
59.6	51	8.7	8.6	"	1.5	4	9.7	9.7	"	4.3	58 8	9.6	9.7	A 5
11 4.2	58 17	8.8	8.8	"	3.6	17	9.7	9.7	"	0.4	9	8.6	8.6	A
10 59.0	35	8.9	8.9	"	4.3	57 59	9.7	9.7	[]	1.7	7	8.6	8.5	"
11 2.7	15	8.9	7.1	[]	2.3	58 31	9.9	9.9	"	0.6	13	8.9	8.2	"
10 59.1	30	9.1	9.2	"	10 58.3	2	10.0	10.0	"	0.7	15	8.9	8.5	"
11 3.4	36	9.1	8.5	"	59.1	13	10.0	10.0	"	0.8	10	8.9	8.9	"
5.3	38	9.1	9.1	[]	11 0.0	57 45	10.0	10.0	"	0.5	10	9.1	8.3	"
10 59.1	57 56	9.5	9.5	"	0.1	58 23	10.0	10.0	"	0.5	9	9.1	9.1	"
59.4	47	9.7	9.7	"	0.5	57 56	10.0	10.0	"	1.0	18	9.1	9.1	"
11 3.4	58 8	9.7	9.7	[]	1.2	58 0	10.0	10.0	"	2.4	19	9.1	9.1	"
10 58.5	17	9.0	9.1	B	2.7	57 56	10.0	10.0	"	0.4	17	9.4	9.4	"
11 4.3	57 53	9.0	8.8	"	3.9	58 11	10.0	10.0	"	3.0	16	9.4	9.4	"
3.7	58 6	10.1	9.9	"	4.1	57 53	10.0	10.0	[]	3.4	15	9.7	9.7	"
3.0	22	8.2	8.2	A 0	10 58.4	58 29	10.2	10.2	"	10 59.5	2	10.0	10.0	"
3.5	13	8.2	8.2	"	59.0	4	10.2	10.2	"	59.8	57 55	10.0	10.0	"
2.7	57 42	8.4	8.5	[]	11 2.6	57 47	10.2	10.2	"	11 0.8	50	10.0	10.0	"
1.0	58 15	8.5	8.5	"	3.9	37	10.2	10.2	"	1.6	57	10.0	10.0	"
0.7	8	8.6	8.6	"	0.0	58 4	10.3	10.3	"	5.4	58 8	10.0	10.0	"
10 58.3	57 50	8.7	9.5	"	0.0	4	10.3	10.3	"	10 59.1	57 48	10.2	10.2	"
58.9	58 34	8.7	8.2	"	2.6	12	8.4	8.5	A 2	11 3.7	58 31	10.3	10.3	"
11 0.1	14	8.7	7.9	"	5.5	10	8.5	8.6	"	4.2	8	10.6	10.6	"
1.0	32	8.8	8.9	"	0.0	57 56	8.6	8.9	"	4.3	21	8.9	8.3	[F 0]
4.0	24	8.8	8.8	"	4.9	58 11	8.6	8.0	"	0.0	11	8.4	8.5	[F 2]
10 59.5	15	8.9	8.9	"	0.9	28	8.7	8.8	"	4.4	26	4.02	5.5	[F 8p]
11 1.1	57 40	8.9	8.9	"	3.8	18	8.7	8.8	"	5.4	18	var	var.	[F 8]
1.4	58 11	8.9	8.9	"	4.6	17	8.7	8.8	[]	10 58.6	10	8.4	8.8	[G 5]
2.4	12	8.9	7.5	"	2.5	32	8.8	8.9	"	11 0.3	13	8.4	8.5	"
5.8	19	8.9	8.9	[]	4.7	25	8.8	8.9	"	0.3	9	8.7	8.5	"
10 58.9	57 51	9.1	8.8	"	0.7	29	9.0	8.0	"	10 59.2	15	9.1	9.2	G
59.0	58 21	9.1	9.1	"	1.9	6	9.0	9.1	"	11 1.8	11	8.9	8.8	"
59.3	1	9.1	9.1	"	3.8	57 57	9.0	9.1	"	2.3	7	6.07	8.2	K 0
59.3	40	9.1	9.1	"	3.9	58 27	9.1	9.2	"	3.7	57 45	7.9	8.8	[]
11 1.5	11	9.1	9.1	"	10 58.6	57 58	9.3	9.4	"	0.0	56	8.6	8.9	"
3.2	33	9.1	9.4	"	11 1.6	58 0	9.3	9.4	"	10 59.5	42	9.0	10.0	[]
5.6	57 43	9.1	9.1	[]	2.9	57 59	9.3	9.4	"	11 2.5	58 3	8.9	10.0	K 2
10 59.3	58 13	9.2	9.2	"	6.1	58 22	9.3	9.4	"	5.1	57 59	9.1	10.2	[]
59.8	20	9.2	9.2	"	3.5	57 58	9.4	9.5	"	1.2	43	9.0	10.0	K

TAB. B.

<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.
8	<i>B</i> 0	1	<i>B</i> 6	34	<i>A</i> 2	10	<i>F</i> 2	8	<i>G</i> 5
1	<i>B</i> 1	39	<i>B</i> 8	13	<i>A</i> 3	14	<i>F</i> 5	30	<i>K</i> 0
6	<i>B</i> 2	38	<i>B</i> 9	7	<i>A</i> 5	5	<i>F</i> 8	10	<i>K</i> 2
8	<i>B</i> 3	9	<i>B</i>	5	<i>A</i>	4	<i>G</i> 0	10	<i>M</i>
17	<i>B</i> 5	111	<i>A</i> 0	17	<i>F</i> 0	1	<i>G</i> 4	3	<i>O</i>

M-e 104. (Not in N. G. C.).

A regular, condensed and well defined cl. with exclusively faint stars. No stars in D. C.

89.

Pl. 10.

$\alpha = 11^h 13.^m 6$

$\delta = -62^\circ 10'$

*GD*₉ F. A. C. 18

$\bar{n} = 14.6$ $a = 34$

II *TI*

$d = 15-18$

$n = 79$

90.

$\alpha = 11^h 15.^m 2$

$\delta = -62^\circ 58'$

*GD*₉ F. A. C. 18

$\bar{n} = 14.4$ $a = 45$

II *TI*

$d = [4]$ $n = 17$

M-e 105. (Not in N. G. C.).

A very small cl. so sharply condensed at the centre, that the star-counting gets very difficult. No stars in D. C.

91.

Pl. 10.

$\alpha = 11^h 20.^m 9$

$\delta = -42^\circ 41'$

*GC*₉ F. A. C. 34

$\bar{n} = 4.5$ $a = 114$

III *TI*

$d = [12]$ $n = 33$

N. G. C. 3680 (*M-e* 106).

A well defined but thin, fairly regular cl. Some slight condensation visible. Contains scarcely any very faint stars. Clusters whose brightest stars are so faint as in this case contain as a rule a larger number of very faint stars. No stars in D. C.

92.

Pl. 10.

$\alpha = 11^h 31.^m 5$

$\delta = -61^\circ 3'$

*GD*₉ F. A. C. 18

$\bar{n} = 34.2$ $a = 36$

III *TI* $d = [12]$

$n_B = 4$ $n_A = 1$

N. G. C. 3766 (*M-e* 107).

This cl. contains a great number of bright stars which lie so close together that it is quite impossible to distinguish and count them.

TAB. A.

α	δ	<i>m</i>	<i>m'</i>	Sp.
11 ^h 31. ^m 9	-61° 6'	6.7	7.2	<i>B</i> 0
32.1	60 58	9.1	9.0	<i>B</i> 5
31.2	61 0	8.5	8.3	<i>B</i>
31.3	3	8.5	8.3	"
32.2	7	9.1	8.9	<i>B</i> 8

TAB. B.

<i>n</i>	Sp.
2	<i>B</i> 5
3	<i>B</i> 8
2	<i>A</i> 0
1	<i>K</i> 0
1	<i>Ma</i>

M-e 108 (Not in N. G. C.).

A small, irregular cl. with distinct condensation. No stars in D. C.

93.
Pl. 11.
 $\alpha = 11^h 45.^m 9$
 $\delta = -55^\circ 8'$
 GC_9 F. A. C. 18
 $\bar{n} = 7.1$ $a = 95$
II T III
 $d = [8]$ $n = 48$

N. G. C. 4103 (M-e 109).

A very dense crowd of rather bright stars.

94.
Pl. 11.
 $\alpha = 12^h 1.^m 5$
 $\delta = -60^\circ 41'$
 GC_9 F. A. C. 19
 $\bar{n} = 15.0$ $a = 86$
II T I
 $d = [9]$ $n = 25$
 $n_A = 1$

TAB. A.

α	δ	m	m'	Sp.
$12^h 1.^m 6$	$-60^\circ 37'$	8.9	8.9	A 0

TAB. B.

n	Sp.	n	Sp.
2	B	3	K
2	A 0	1	M

N. G. C. 4349 (M-e 110).

A large, dense and rather regular cl.; well defined though situated in a very rich region. A clear condensation. The brightest stars are rather distant from the centre.

95.
Pl. 15.
 $\alpha = 12^h 19.^m 0$
 $\delta = -61^\circ 20'$
 GC_9 F. A. C. 19
 $\bar{n} = 16.8$ $a = 56$
II T I
 $d = 26-31$
 $n = 61$ $n_A = 1$
 $n_F = 1$

TAB. A.

α	δ	m	m'	Sp.
$12^h 20.^m 2$	$-61^\circ 11'$	8.7	8.7	[B 9]
19.3	7	8.8	8.8	[A 0]
18.5	33	8.5	8.6	A 2
19.1	21	8.4	8.6	F 5

TAB. B.

n	Sp.	n	Sp.	n	Sp.
1	B 0	9	A 0	3	F 5
2	B 5	1	A 2	5	F 8
3	B 8	1	F 0	4	G 5
8	B 9	1	F 2	3	K 0

N. G. C. 4755 (M-e 114).

The cl. consists of a group of stars situated round α Crucis. Four very bright stars are lying close together and certainly do not belong to the cl.

96.
Pl. 11.
 $\alpha = 12^h 47.^m 7$
 $\delta = -59^\circ 48'$
 GC_{10} F. A. C. 19
 $\bar{n} = 16.6$ $a = 1$
II T II
 $d = [12]$ $n = 50$

TAB. A.

α	δ	m	m'	Sp.
$12^h 47.^m 7$	$-59^\circ 49'$	6.86	7.2	[B 2]
47.9	50	6.11	8.5	[B 3]
48.0	47	7.9	6.8	[,]
47.4	47	5.84	5.5	[B 9p]

TAB. B.

n	Sp.
4	B 3
1	B 5
2	B 8
2	A

N. G. C. 4852 (M-e 116).

97.

Pl. 11.

$$\alpha = 12^h 54.^m 1$$

$$\delta = -59^\circ 4'$$

GC_{10} F. A. C. 19

$$\bar{n} = 16.2 \quad a = 16$$

I I T III

$$d = [12] \quad n = 61$$

A rather small, well defined and condensed cl. The outsides thin. From the centre, which forms a well limited whole, several offshoots start out which give the cl. an irregular outline. No stars in D. C.

N. G. C. 5281 (M-e 120).

98.

$$\alpha = 13^h 39.^m 7$$

$$\delta = -62^\circ 24'$$

GD_{10} F. A. C. 20

This cl. is not shown on the chart.

N. G. C. 5316 (M-e 122).

99.

Pl. 12.

$$\alpha = 13^h 46.^m 9$$

$$\delta = -61^\circ 22'$$

GD_{10} F. A. C. 20

$$\bar{n} = 15.0 \quad a = 70$$

I II T III

$$d = 28-34$$

$$n = 31 \quad n_A = 2$$

$$n_F = 1 \quad n_G = 1$$

$$n_K = 1$$

A very well defined (Melotte maintains the contrary), thin cl. containing exclusively middlebright stars. Distinct condensation at the centre from where issue several offshoots which make the determination of the total diameter doubtful.

TAB. A.

α	δ	m	m'	Sp.
$13^h 46.^m 8$	$-61^\circ 24'$	9.5	9.5	[B 8]
47.6	25	8.8	9.2	B 9
46.5	9	8.9	8.9	[]
48.5	29	9.1	9.2	A 2
45.5	20	8.3	9.1	F 5
47.9	26	9.2	10.0	G 5
46.4	8	8.3	9.1	K 2

TAB. B.

n	Sp.	n	Sp.
2	B 0	1	A 3
2	B 5	2	A 5
12	B 8	5	F
16	B 9	5	G
13	A 0	10	K
5	A 2		

N. G. C. 5460 (M-e 123).

100.

Pl. 16.

$$\alpha = 14^h 1.^m 2$$

$$\delta = -47^\circ 50'$$

GC_{10} F. A. C. 36

$$\bar{n} = 9.4 \quad a = 112$$

I II T IV

$$d = 44-53$$

$$n = 72 \quad n_A = 9$$

A very large, exceptionally irregular cl. with almost exclusively bright stars. No condensation; in several places the brightest stars lie two by two very close together.

TAB. A.

α	δ	m	m'	Sp.
$14^h 1.^m 1$	$-47^\circ 59'$	9.5	9.0	B 8
1.2	42	8.6	7.7	B 9
1.2	51	9.2	8.8	"
0.5	48	9.3	9.3	"
0.5	49	9.3	9.1	"
1.1	50	9.2	8.8	A 0
1.0	56	10.1	9.4	"
13 59.9	54	10.2	9.6	"
14 1.0	50	10.6	9.6	"
1.0	50	11.0	9.6	[]
2.0	47	9.1	9.1	[F 8]
13 59.3	59	9.0	9.3	[G 5]
14 2.5	54	7.8	8.2	[K 0]

TAB. B.

n	Sp.
1	B 8
5	B 9
1	A
15	A 0
4	A 2
5	A 3
3	A 5
13	F
12	G
20	K

N. G. C. 5617 (M-e 125).

A rather large, well defined cl. with strong condensation. Only rather faint stars. At the centre the density is so great that it is difficult to count the stars.

101.
Pl. 16.
 $\alpha = 14^h 22.^m 3$
 $\delta = -60^\circ 16'$
 GD_{10} F. A. C. 20
 $\bar{n} = 19.6$ $a = 6$
I I T I
 $d = 23-27$
 $n = 122$ $n_B = 1$
 $n_A = 1$ $n_F = 1$
 $n_K = 3$ $n_M = 1$

TAB. A.

α	δ	m	m'	Sp.
$14^h 21.^m 3$	$-60^\circ 6'$	8.60	8.9	<i>B 5</i>
21.1	7	9.60	9.1	<i>A 0</i>
22.5	12	10.0	10.0	[„]
22.8	22	9.1	9.4	<i>F 2</i>
22.6	24	8.6	10.2	<i>K 0</i>
23.2	25	9.1	10.3	„
23.1	5	9.24	10.6	„
21.6	12	8.8	10.7	<i>Ma</i>

TAB. B.

n	Sp.	n	Sp.
2	<i>B 2</i>	1	<i>A 3</i>
1	<i>B 3</i>	2	<i>F</i>
1	<i>B 5</i>	3	<i>G</i>
5	<i>B 9</i>	7	<i>K</i>
10	<i>A 0</i>	2	<i>M</i>
4	<i>A 2</i>		

N. G. C. 5662 (M-e 127).

Consists of a small number of bright stars, unequally dispersed. Not well defined; irregular outline. Falls in a rich region. Melotte's value of the diameter is quite too small.

102.
Pl. 12.
 $\alpha = 14^h 28.^m 0$
 $\delta = -56^\circ 7'$
 GC_{10} F. A. C. 20
 $\bar{n} = 15.3$ $a = 57$
I II T IV
 $d = 28-34$
 $n = 21$ $n_A = 9$
 $n_F = 1$ $n_K = 1$

TAB. A.

α	δ	m	m'	Sp.
$14^h 28.^m 6$	$-56^\circ 11'$	8.0	8.3	<i>B 8</i>
28.8	5	8.4	9.0	„
28.4	2	8.9	9.5	„
28.9	2	8.5	9.3	<i>B 9</i>
28.1	20	9.1	9.5	„
28.0	17	9.5	9.5	„
26.7	19	9.8	9.8	„
28.4	17	9.8	9.8	„
27.8	0	10.4	10.4	[„]
28.3	11	9.5	9.5	<i>A 0</i>
26.5	11	10.6	10.6	[„]
28.3	20	9.1	10.1	<i>F 0</i>
28.0	8	7.04	8.9	<i>K 2</i>

TAB. B.

n	Sp.
2	<i>B 8</i>
8	<i>B 9</i>
8	<i>A 0</i>
2	<i>A 2</i>
2	<i>A 5</i>
3	<i>A</i>
2	<i>F 0</i>
1	<i>F 5</i>
1	<i>G 5</i>
5	<i>K 0</i>
2	<i>K 2</i>
1	<i>M</i>

N. G. C. 5715 (M-e 128).

A not well defined cl. which imperceptibly fades into the surroundings. Irregular outline. Melotte's estimate of the diameter is too low.

103.
Pl. 13.
 $\alpha = 14^h 36.^m 1$
 $\delta = -57^\circ 7'$
 GC_{10} F. A. C. 20
 $\bar{n} = 12.5$ $a = 47$
I II T III
 $d = [12]$ $n = 51$
 $n_G = 1$

TAB. A.

α	δ	m	m'	Sp.
$14^h 35.^m 9$	$-57^\circ 4'$	9.9	10.7	<i>G 5</i>

TAB. B.

n	Sp.	n	Sp.	n	Sp.
2	<i>B 8</i>	4	<i>A 2</i>	2	<i>G</i>
4	<i>B 9</i>	1	<i>F</i>	2	<i>K</i>
8	<i>A 0</i>				

N. G. C. 5822 (M-e 130).

A very large, thin cl. which (contrary to Melotte's statement) is well separated from the environs. The condensation is clear. Rather regular outline.

104.

Pl. 17.

$\alpha = 14^h 57.^m 9$

$\delta = -53^\circ 57'$

GC_{10} F. A. C. 20

$\bar{n} = 9.8$ $a = 110$

I II T IV

$d = 45-54$

$n = 73$ $n_A = 6$

$n_G = 2$

TAB. A.

α	δ	m	m'	Sp.
$14^h 55.^m 3$	$-54^\circ 6'$	8.2	9.2	B 8
15 0.2	53 57	8.4	9.0	"
14 58.1	39	9.8	9.8	"
57.7	54 3	10.4	10.4	[B 9]
58.0	12	10.1	10.1	A 0
56.6	10	10.4	10.4	"
58.9	12	10.4	10.4	["]
59.8	53 47	10.4	10.4	["]
58.5	54 2	10.7	10.7	["]
15 0.3	10	9.2	10.1	A 3
14 58.9	7	9.1	10.4	G 0
58.4	19	9.9	10.7	G 5
56.7	53 57	9.3	10.4	[K 2]

TAB. B.

n	Sp.
4	B 8
17	B 9
1	B
48	A 0
18	A 2
2	A 3
7	A
9	F
4	G 0
8	G 5
32	K
3	M
1	N

N. G. C. 5823 (M-e 131).

A well defined, thin cl. with a very distinct condensation. The outsides very thin. The greatest part of the bright stars lie at the centre, the limits of which are particularly pronounced. Regular outline.

105.

Pl. 13.

$\alpha = 14^h 58.^m 3$

$\delta = -55^\circ 12'$

GC_{10} F. A. C. 20

$\bar{n} = 9.8$ $a = 97$

I II T I

$d = 19-22$

$n = 75$ $n_F = 1$

TAB. A.

α	δ	m	m'	Sp.
$14^h 57.^m 3$	$-55^\circ 7'$	9.0	9.8	F 0

TAB. B.

n	Sp.	n	Sp.	n	Sp.
2	B 8	2	A 2	5	K
4	B 9	3	A 3	1	M
10	A 0	1	F 0		

N. G. C. 5999 (M-e 137).

A well defined, dense, regular cl. with pronounced condensation. The stars at the centre are lying so close that it is difficult to count them.

106.

Pl. 13.

$\alpha = 15^h 44.^m 9$

$\delta = -56^\circ 10'$

GD_{10} F. A. C. 21

$n = 13.7$ $a = 61$

I II T I

$d = [10]$ $n = 85$

$n_A = 1$

TAB. A.

α	δ	m	m'	Sp.
$15^h 44.^m 9$	$-56^\circ 14'$	9.8	9.8	A 0

TAB. B.

n	Sp.	n	Sp.
1	B 9	1	F
2	A 0	1	G
1	A 2		

107.

Pl. 13.

$$\alpha = 15^h 47.^m$$

$$\delta = -57^\circ 8'$$

GD_{10} F. A. C. 21

$$\bar{n} = 18.9 \quad a = 45$$

I II T I

$$d = [4] \quad n = 23$$

108.

Pl. 14.

$$\alpha = 15^h 55.^m$$

$$\delta = -60^\circ 13'$$

GD_{10} F. A. C. 21

$$\bar{n} = 23.1 \quad a = 10$$

I I T III

$$d = 17-21$$

$$n = 42 \quad n_B = 2$$

$$n_A = 4$$

N. G. C. 6005 (M-e 138).

A very small, condensed cl. with faint stars. No stars in D. C.

N. G. C. 6025 (M-e 139).

Contains mainly very bright stars. This cl. seems to be devoid of faint stars. Rather well defined with irregular outline. The brightest stars are to be found at the centre where they form two dense groups.

TAB. A.

α	δ	m	m'	Sp.
$15^h 55.^m$	$-60^\circ 13'$	6.97	7.8	B3p
55.0	12	8.38	8.6	B8
54.4	10	8.9	8.9	"
54.9	6	9.3	9.3	"
55.2	14	6.97	8.6	B
54.7	7	8.88	8.0	A

TAB. B.

n	Sp.	n	Sp.
6	B8	1	A3
4	B9	1	A5
5	A0	3	F
5	A2	6	K

N. G. C. 6067 (M-e 140).

The stars of this cl. are strongly condensed owing to which the counting got quite impossible. Regular outline; well defined.

TAB. A.

α	δ	m	m'	Sp.
$16^h 5.^m$	$-53^\circ 52'$	9.7	9.5	B3

TAB. B.

n	Sp.	n	Sp.	n	Sp.
1	B0	1	A0	1	G
1	B5	2	A2	8	K
3	B8	3	A3	1	M
4	B9	5	F		

109.

Pl. 17.

$$\alpha = 16^h 5.^m$$

$$\delta = -53^\circ 57'$$

GD_{10} F. A. C. 21

$$\bar{n} = 26.5 \quad a = 87$$

I II T I

$$d = [15]$$

$$n_B = 1$$

N. G. C. 6087 (M-e 141).

This cl. presents the same aspect as N. G. C. 6025; the bright stars at the centre are gathered into two dense groups. The faint stars are to be found mainly at the outsides. Rather irregular outline.

110.

Pl. 18.

$$\alpha = 16^h 10.^m$$

$$\delta = -57^\circ 39'$$

GD_{10} F. A. C. 21

$$\bar{n} = 23.2 \quad a = 38$$

I II T III

$$d = 15-18$$

$$n = 81 \quad n_B = 1$$

$$n_A = 8 \quad n_G = 1$$

$$n_K = 1 \quad n_M = 1$$

TAB. A.

α	δ	m	m'	Sp.
$16^h 11.^m$	$-57^\circ 39'$	8.8	8.6	B5
10.6	41	8.5	7.5	B8
11.4	40	8.5	8.5	"
10.4	42	8.9	8.9	"
10.2	35	9.2	9.4	"
11.2	38	9.2	8.8	"
11.7	40	10.0	10.0	B9
11.4	42	9.4	9.4	A0
9.9	36	10.0	10.0	"
10.6	39	var.	var.	G Op.
9.6	41	8.1	8.2	K0
9.7	44	9.0	10.2	Ma

TAB. B.

n	Sp.	n	Sp.
1	B5	1	G0
3	B8	1	G5
3	B9	2	K0
5	A0	1	K2
3	A2	1	M

N. G. C. 6124 (M-e 145).

This cl. is one of the finest examples of open clusters: circular, well defined, with distinct condensation, and gradually decreasing density. At the centre lies the majority of the bright stars. Numerous faint stars are to be found at the outsides.

111.

Pl. 18.

$$\alpha = 16^h 18.^m 8$$

$$\delta = -40^\circ 26'$$

$$GC_{11} \text{ F. A. C. } 38$$

$$\bar{n} = 3.1 \quad a = 83$$

$$I \text{ II } T \text{ I}$$

$$d = 33-39$$

$$n = 104$$

$$n_A = 7 \quad n_K = 3$$

TAB. A.

α	δ	m	m'	Sp.
$16^h 20.^m 2$	$-40^\circ 20'$	8.8	9.7	B 8
18.2	25	8.9	9.1	"
18.0	22	9.1	9.4	B 9
19.0	24	10.3	10.5	"
18.7	31	11.0	10.0	"
19.0	31	10.1	10.0	A 0
18.8	26	10.8	10.0	"
18.8	33	9.1	9.1	[F 8]
19.1	20	9.1	10.3	K 0
18.0	32	9.5	10.9	"
19.1	38	8.8	10.5	K 2
19.4	28	9.4	10.5	["]

TAB. B.

n	Sp.
4	B 9
8	A 0
1	A 2
1	A 3
1	A 5
2	A
9	F
9	G
11	K

N. G. C. 6134 (M-e 146).

A fairly regular cl., sharply separated from the environs, and with so close concentration that the stars of the centre are difficult to distinguish. The brightest star which falls in the cl. is, according to what the calculation shows, not likely to belong to it.

112.

Pl. 14.

$$\alpha = 16^h 20.^m 3$$

$$\delta = -48^\circ 55'$$

$$GD_{11} \text{ F. A. C. } 38$$

$$\bar{n} = 16.3 \quad a = 78$$

$$I \text{ II } T \text{ III}$$

$$d = [10] \quad n = 76$$

TAB. A.

α	δ	m	m'	Sp.
$16^h 20.^m 5$	$-48^\circ 59'$	9.5	9.0	[B 8]

TAB. B.

n	Sp.	n	Sp.
1	B 9	1	F
1	A 0	3	K
1	A 3		

N. G. C. 6192 (M-e 149).

A pronounced cl. with so strong concentration that it is difficult to distinguish the stars at the centre. Rather irregular form.

113.

Pl. 15.

$$\alpha = 16^h 33.^m 3$$

$$\delta = -43^\circ 10'$$

$$GC_{11} \text{ F. A. C. } 38$$

$$\bar{n} = 7.9 \quad a = 91$$

$$I \text{ II } T \text{ III}$$

$$d = 16-19$$

$$n = 69 \quad n_A = 1$$

TAB. A.

α	δ	m	m'	Sp.
$16^h 34.^m 0$	$-43^\circ 12'$	10.1	10.0	A 2
33.4	10	Cl.	Cl.	Con.

TAB. B.

n	Sp.	n	Sp.
1	B 3	1	A 3
1	B 8	1	F
4	A 0	3	K
2	A 2		

N. G. C. 6222 (M-e 152).

Not distinctly shown on the chart.

114.

$$\alpha = 16^h 43.^m 5$$

$$\delta = -44^\circ 33'$$

$$GD_{11} \text{ F. A. C. } 39$$

N. G. C. 6242 (M-e 155).

115.
Pl. 15.
 $\alpha = 16^h 48.^m 8$
 $\delta = -39^\circ 20'$
 GC_{11} F. A. C. 39
 $\bar{n} = 5.3$ $a = 119$
I II *T* I
 $d = 25-31$
 $n = 65$

A dense, fairly regular cl., sharply separated from the surroundings, and with so strong concentration that it is very difficult to count and estimate the stars of the centre. On the contrary, the cl. is very thin at the outlines. The brightest stars lie at the centre. No stars in D. C.

N. G. C. 6253 (M-e 156).

116.
 $\alpha = 16^h 51.^m 2$
 $\delta = -52^\circ 33'$
 GD_{11} F. A. C. 39
 $\bar{n} = 15.0$ $a = 134$
I II *T* III
 $d = [6]$ $n = 28$

A very small, dense, circular cl., distinctly separated from the environs. The pictures on the chart are very indistinct. The diameter estimated at 6'. Contains exclusively faint stars. No stars in D. C.

N. G. C. 6259 (M-e 158).

117.
Pl. 19.
 $\alpha = 16^h 53.^m 5$
 $\delta = -44^\circ 31'$
 GD_{11} F. A. C. 39
 $\bar{n} = 6.6$ $a = 70$
I II *T* I
 $d = 24-29$
 $n = 122$ $n_F = 1$

A very dense, fairly regular cl., well separated from the surroundings and containing only faint stars. The pictures on the chart rather indistinct and difficult to distinguish.

TAB. A.

α	δ	m	m'	Sp.
$16^h 54.^m 6$	$-44^\circ 22'$	9.2	8.8	<i>F</i> 8

TAB. B.

n	Sp.	n	Sp.	n	Sp.
2	<i>B</i> 8	1	<i>A</i> 3	5	<i>G</i>
1	<i>B</i>	1	<i>A</i> 5	6	<i>K</i>
11	<i>A</i> 0	2	<i>F</i>	2	<i>M</i>
4	<i>A</i> 2				

N. G. C. 6281 (M-e 161).

118.
Pl. 19.
 $\alpha = 16^h 58.^m 0$
 $\delta = -37^\circ 45'$
 GC_{11} F. A. C. 39
 $\bar{n} = 10.8$ $a = 122$
I II *T* III
 $d = 21-25$
 $n = 51$

Rather sharply defined centre with many bright stars which lie close together. The outlines, on the contrary, being thin and containing faint stars, the cl. fades imperceptibly into the surroundings. Fairly regular. No stars in D. C.

N. G. C. 6318 (M-e 166).

119.
 $\alpha = 17^h 10.^m 8$
 $\delta = -39^\circ 20'$
 GD_{11} F. A. C. 39

Not distinctly shown on the chart.

I. C. 4651 (M-e 169).

120.
Pl. 20.
 $\alpha = 17^h 16.^m 9$
 $\delta = -49^\circ 50'$
 GD_{11} F. A. C. 39
 $\bar{n} = 15.4$ $a = 74$
I II *T* I
 $d = 21-26$
 $n = 98$

A rich, dense cl. of mainly faint stars well separated from the environs. At the centre lies a very dense group of stars which it is difficult to distinguish. Regular form. The bright stars are to be found at the centre. No stars in D. C.

N. G. C. 6400 (M-e 177).

121.
Pl. 16.
 $\alpha = 17^h 32.^m 7$
 $\delta = -36^\circ 53'$
 GD_{11} F. A. C. 39
 $\bar{n} = 9.2$ $a = 125$
I II *T* III
 $d = [7]$ $n = 26$

A rather small, dense, sharply defined cl. of very irregular form: only (about) the half of it contains some very bright stars which are to be found at a fairly concentrated centre. No stars in D. C.

N. G. C. 6405 M. 6 (M-e 178).

122.
Pl. 20.
 $\alpha = 17^h 33.^m 5$
 $\delta = -32^\circ 9'$
 GD_{11} F. A. C. 62
 $\bar{n} = 7.8$ $a = 87$
I II *T* III
 $d = 41-49$
 $n = 80$ $n_B = 1$
 $n_A = 20$ $n_G = 2$
 $n_K = 1$

A very large, nearly circular, and very well-defined cl. of exclusively very bright and middle-bright stars. About the same density everywhere. The brightest stars fall mainly in one half of the cl.

TAB. A.

α	δ	m	m'	Sp.
$17^h 33.^m 1$	$-32^\circ 16'$	7.03	7.2	<i>B</i> 5
33.5	9	6.86	6.8	<i>B</i> 8
33.6	12	7.14	7.5	"
34.2	5	8.0	7.6	"
33.4	23	8.0	8.2	<i>B</i> 9
35.1	3	8.0	7.6	"
33.8	13	9.4	7.7	"
33.3	19	9.8	8.5	"
33.4	31 59	10.0	8.9	"
33.8	32 7	10.0	8.5	"
33.9	31 57	10.4	9.2	"
34.0	32 16	10.4	8.5	"
33.6	17	11.8	8.0	"
34.6	13	9.4	8.9	<i>A</i> 0
32.9	9	9.4	9.1	"
33.3	7	9.8	8.5	"
34.5	6	10.0	8.5	"
34.0	9	10.0	8.5	"
32.0	22	10.2	9.2	"
32.9	18	10.2	8.8	["]
33.8	31 50	10.4	9.1	"
32.7	32 4	10.4	9.9	<i>A</i> 2
32.1	25	9.4	9.1	<i>G</i> 0
31.9	31 56	9.5	9.7	<i>G</i> 5
34.4	32 10	var.	var.	<i>K</i> 0

TAB. B.

n	Sp.
2	<i>O</i> e 5
6	<i>B</i> 8
6	<i>B</i> 9
1	<i>B</i>
21	<i>A</i> 0
5	<i>A</i> 2
1	<i>A</i> 5
4	<i>F</i>
2	<i>G</i> 0
3	<i>G</i> 5
1	<i>G</i>
6	<i>K</i> 0
3	<i>K</i> 2
2	<i>K</i> 5
2	<i>M</i>

N. G. C. 6451 (M-e 181).

Situated in the Sagittarius cloud; a group of faint stars.
No stars in D. C.

123.
Pl. 16.
 $\alpha = 17^h 44.^m 3$
 $\delta = -30^\circ 11'$
 GD_{11} F. A. C. 62
 $\bar{n} = 23.0$ $a = 47$
I II T I
 $d = [5]$ $n = 28$

N. G. C. 6469 (M-e 182).

A rather thin cl. of fairly irregular form; not very distinctly separated from the environs. Scarcely perceptible concentration. The stars fairly evenly distributed; mostly very faint.

124.
Pl. 16.
 $\alpha = 17^h 46.^m 9$
 $\delta = -22^\circ 19'$
 GC_{12} F. A. C. 62
 $\bar{n} = 4.8$ $a = 121$
I II T IV
 $d = 22-27$
 $n = 39$ $n_A = 1$

TAB. A.

α	δ	m	m'	Sp.
$17^h 47.^m 2$	$-22^\circ 19'$	9.8	9.5	B 8

TAB. B.

n	Sp.	n	Sp.
2	B 8	2	F 8
6	A 9	2	G
1	F 0	3	K

N. G. C. 6475. M. 7 (M-e 183).

This cl. which is very large and thin should properly be included in Melotte's class IV.

No. 183 presents a rather peculiar aspect. The centre consists of about fifteen very bright stars. Round this group the other bright stars are scattered very unevenly and very thinly.

125.
Pl. 21.
 $\alpha = 17^h 47.^m 3$
 $\delta = -34^\circ 47'$
 GD_{11} F. A. C. 62
 $\bar{n} = 19.2$ $a = 80$
I II T III
 $d = 120-144$
 $n = 188$ $n_A = 79$
 $n_G = 1$ $n_K = 9$

TAB. A.

α	δ	m	m'	Sp.	α	δ	m	m'	Sp.
$17^h 45.^m 6$	$-34^\circ 47'$	5.97	6.4	B 8	$17^h 42.^m 8$	$-34^\circ 5'$	10.0	8.6	B 9
48.7	20	10.2	8.7	"	44.0	35 42	10.0	8.7	[>]
51.8	26	10.2	8.9	[>]	43.1	34 18	10.2	8.9	"
45.1	10	10.7	8.9	[>]	43.2	55	10.2	8.9	[>]
49.9	10	10.7	8.9	[>]	44.7	48	10.4	8.9	"
50.0	3	10.7	8.9	"	44.1	25	10.9	8.9	"
47.3	43	6.08	6.4	B 9	49.5	0	10.9	9.4	[>]
46.7	42	6.20	6.6	"	47.8	26	6.05	6.9	A 0
49.5	35 1	6.70	7.1	"	47.1	45	6.38	7.1	"
46.6	34 35	6.77	7.3	"	46.3	35 0	6.48	7.4	"
44.4	35 19	6.89	7.3	"	47.3	34 48	6.45	7.1	"
45.2	21	7.22	7.4	"	48.2	31	6.63	7.1	"
46.7	34 59	7.28	7.7	"	47.6	42	6.88	7.3	"
44.4	35 2	7.52	8.0	"	47.7	51	7.18	7.1	"
44.1	31	7.6	7.8	"	42.8	35 21	7.19	7.8	"
50.1	11	7.83	7.4	"	48.1	33 53	7.6	7.5	"
48.1	33 56	8.0	7.9	"	47.6	34 48	7.63	7.7	"
48.2	35 4	8.03	8.0	"	47.1	49	7.88	8.0	"
49.3	34 16	8.7	7.8	[>]	45.7	57	8.38	8.1	"
45.3	35 4	8.77	8.3	"	45.5	59	8.38	8.3	"
46.3	12	9.4	8.3	"	44.8	33 49	8.4	8.2	[>]

α	δ	m	m'	Sp.	α	δ	m	m'	Sp.
17 ^h 45. ^m ₃	— 34° 46'	8.4	10.1	[A 0]	17 ^h 44. ^m ₂	— 34° 11'	8.7	8.0	A 2
49.4	35 1	8.43	8.0	»	48.2	49	8.8	8.9	[»]
43.7	34 27	8.7	8.1	»	45.2	31	9.0	8.3	[»]
46.9	40	8.7	7.4	»	48.9	35 42	9.6	8.7	»
46.9	51	8.7	7.7	»	50.8	34 54	9.6	8.1	»
48.0	33 54	8.7	8.6	»	46.1	30	10.0	9.0	[»]
48.7	34 13	8.7	7.7	»	45.1	35 32	10.4	8.9	»
51.4	33 56	8.7	7.9	[»]	46.8	30	10.4	8.9	[»]
46.4	35 9	8.75	8.7	»	47.3	34 29	10.4	8.3	»
48.5	7	8.78	8.3	»	47.0	43	10.7	8.1	»
46.0	34 55	9.0	7.8	»	47.7	33 54	10.7	9.4	»
44.8	35 1	9.08	8.6	»	49.1	35 18	10.7	8.9	[»]
48.2	34 44	9.1	8.4	[»]	50.1	34 30	8.7	8.3	A 3
46.0	19	9.3	8.4	»	44.8	31	9.4	8.6	»
46.8	33 45	9.3	8.9	»	46.3	34	9.4	8.6	»
48.4	34 57	9.38	8.9	»	51.1	35 15	9.4	8.9	»
43.8	17	9.4	8.3	»	46.0	30	10.0	8.7	»
49.8	28	9.4	8.3	»	45.8	34 50	10.7	8.4	A 5
49.0	33 48	9.4	8.9	»	47.1	46	7.28	7.7	A
50.3	34 44	9.4	8.3	[»]	46.8	33 44	10.2	9.4	»
43.6	40	9.8	8.9	»	49.4	34 9	11.1	9.0	»
49.8	44	9.8	8.7	[»]	50.6	14	9.4	8.6	[F 0]
46.3	25	10.0	8.3	»	46.3	35 36	6.04	7.1	[F 2]
43.0	11	10.2	8.9	»	43.5	20	9.0	8.6	[F 8]
48.3	35 41	10.2	8.9	»	46.2	33 50	9.1	9.9	[G 5]
43.4	33 47	10.2	9.7	[»]	51.0	50	9.4	10.0	[»]
44.3	55	10.4	9.2	»	50.3	35 40	10.4	9.2	G
44.6	34 35	10.4	8.9	»	46.7	34 52	5.68	6.9	K 0
47.9	35 29	10.4	8.0	»	45.7	24	5.84	7.3	»
48.0	34 50	10.4	9.5	[»]	46.2	6	6.12	7.3	»
44.0	3	10.7	9.0	»	47.4	35 11	8.0	8.1	»
45.2	35 5	10.7	8.9	»	44.9	33 59	8.27	9.4	»
45.5	34 38	10.7	8.7	»	51.8	35 3	8.57	8.7	[«]
48.4	35 45	10.7	8.9	[»]	52.1	35 7	8.78	9.2	[»]
45.7	34 36	10.9	8.6	»	43.7	41	8.7	8.7	»
47.8	39	10.9	8.9	»	51.8	8	9.18	9.0	[»]
48.8	33 59	10.9	8.8	[»]	43.5	8	7.88	8.3	K 2
47.3	35 9	11.1	8.9	»	48.9	34 9	9.0	9.3	K 5
					46.8	23	9.1	8.6	»

TAB. B*.

n	Sp.	n	Sp.	n	Sp.	n	Sp.	n	Sp.
1	B 0	16	B 8	2	A 3	4	F 5	10	K 0
2	B 2	21	B 9	4	A 5	7	F 8	6	K 2
2	B 3	40	A 0	8	F 0	3	G 0	5	K 5
5	B 5	19	A 2	2	F 2	9	G 5	4	M

N. G. C. 6494. M. 23 (M-e 184).

126.

Pl. 21.

$\alpha = 17^h 51.^m 0$

$\delta = -19^\circ 0'$

A very large cl., fairly well separated from the environs and containing many bright stars. Rather unequal distribution without any particularly distinct concentration. The stars gather in many places into closer groups.

* The area which Tab. B embraces is three times as large as the area of the cluster.

GC_{12} F. A. C. 86
 $\bar{n} = 4.0$ $a = 68$
 $I\ II$ $T\ III$
 $d = 43-51$
 $n = 151$
 $n_A = 19$ $n_G = 2$
 $n_K = 3$

TAB. A.

α	δ	m	m'	Sp.
$17^h 51.^m 0$	$-18^\circ 57'$	9.8	9.8	$B\ 8$
50.6	19 1	10.0	10.0	$B\ 9$
51.7	19 8	9.5	9.2	"
50.6	18 55	10.4	10.4	"
50.9	19 5	10.4	9.4	"
50.1	18 47	6.40	6.40	[$A\ 0$]
51.0	19 19	8.7	8.2	"
51.6	18 41	8.9	8.9	"
49.9	19 0	9.5	9.5	"
49.5	19	10.0	9.2	"
52.1	18 55	10.0	10.0	"
51.2	51	10.2	10.2	"
51.8	19 1	10.2	10.2	"
50.9	18 58	10.4	10.4	"
51.1	56	10.4	10.4	"
50.8	50	9.8	9.9	$A\ 2$
50.3	19 3	9.5	9.1	$A\ 3$
51.4	18 57	10.7	10.8	"
51.2	19 2	10.2	9.4	A
51.2	5	10.2	9.7	"
51.5	18 56	8.7	9.5	$G\ 5$
49.6	42	10.2	11.0	"
52.5	19 14	9.2	9.9	$K\ 0$
49.5	17	9.3	9.4	"
52.3	16	9.2	9.9	$K\ 2$

TAB. B.

n	Sp.
1	$B\ 3$
1	$B\ 5$
5	$B\ 8$
5	$A\ 2$
4	$A\ 3$
3	$A\ 5$
6	A
6	F
2	$G\ 0$
5	$G\ 5$
7	$K\ 0$
1	$K\ 2$
5	$K\ 5$
1	K

N. G. C. 6520 (M-e 187).

127.
 $\alpha = 17^h 57.^m 1$
 $\delta = -27^\circ 54'$
 GD_{12} F. A. C. 62
 $\bar{n} = 24.6$ $a = 32$
 $I\ II$ $T\ I$
 $d = [6]$ $n = 43$
 $n_A = 1$ $n_G = 1$
 $n_K = 1$

Consists of a very close group of bright as well as faint stars which are not to be distinguished clearly. Situated in the densest part of the Sagittarius cloud. Round it lie many bright stars so that Melotte's supposition that this smaller dense group is the centre of a great agglomeration of bright stars scattered over a wide space is entitled to some confidence. (Cpr. M-e 66).

TAB. A.

α	δ	m	m'	Sp.
$17^h 56.^m 9$	$-27^\circ 51'$	9.5	8.3	$A\ 0$
57.1	52	10.0	9.0	$G\ 0$
57.2	55	10.0	10.3	$K\ 0$

TAB. B.

n	Sp.
1	$B\ 8$
1	$A\ 0$
1	$K\ 0$

N. G. C. 6531. M. 21 (M-e 188).

128.
 Pl. 22.
 $\alpha = 17^h 58.^m 6$
 $\delta = -22^\circ 30'$
 GD_{12} F. A. C. 62

An irregular, clearly prominent cl., extremely dense at the centre where the stars are almost undistinguishable. There are at the centre two stars of $m = 7.8$; they are, however, very difficult to distinguish from the stars that lie quite close by them.

$\bar{n} = 5.3$ $a = 111$
 I II T III
 $d = 19-22$
 $n = 35$ $n_B = 4$
 $n_A = 1$ $n_K = 1$

TAB. A.

α	δ	m	m'	Sp.
$17^h 58^{m.2}$	$-22^\circ 30'$	7.8	7.7	B 0
58.0	34	8.9	8.2	B 5
58.7	27	10.7	9.4	"
58.5	23	10.4	9.1	B 8
58.1	30	7.8	7.7	B
59.1	24	10.2	10.3	K 5

TAB. B.

n	Sp.	n	Sp.
2	B 0	12	A
1	B 3	1	F
4	B 5	2	K 0
1	B 8	1	K 5
1	B 9		
2	B		

N. G. C. 6603. M. 24 (M-e 197).

This cl. is situated in a star-cloud. The pictures on the chart are so indistinct that it is not possible to count or estimate them. Seems to consist of exclusively faint stars. No stars in D. C.

129.

$\alpha = 18^h 12^{m.6}$
 $\delta = -18^\circ 27'$
 GD_{12} F. A. C. 86
 $\bar{n} = 4.0$ $a = 70$
 I II T I
 $d = [5]$

N. G. C. 6633 (M-e 201).

A crowd of very bright stars (only a few faint ones which possibly do not belong to the cl.). The greater portion of the stars lies in a circle round a nearly starless centre. Moreover, outside this circle are to be distinguished two very dense groups which also contain bright stars. Accordingly, the distribution is rather uneven and the cl. irregular.

130.

Pl. 22.
 $\alpha = 18^h 22^{m.7}$
 $\delta = +6^\circ 30'$
 GC_1 F. A. C. 110
 $\bar{n} = 3.6$ $a = 121$
 I II T IV
 $d = 31-37$
 $n = 55$ $n_A = 12$
 $n_K = 2$

TAB. A.

α	δ	m	m'	Sp.
$18^h 22^{m.4}$	$+6^\circ 27'$	8.12	8.10	B 9
22.0	22	8.4	8.4	A 0
21.8	28	9.4	9.4	[]
22.9	39	10.4	10.4	"
22.2	28	8.30	8.36	A 2
22.6	31	9.1	9.2	"
23.5	21	9.1	9.2	"
22.9	23	9.4	9.5	"
22.0	25	8.6	8.7	A 3
22.7	29	8.6	8.7	"
22.8	27	8.7	8.8	"
22.2	21	9.4	9.4	A
22.8	35	9.4	9.4	"
23.5	39	9.1	10.1	K 0
23.0	32	8.7	9.5	K 2

TAB. B.

n	Sp.
1	B 8
1	B 9
15	A 0
4	A 2
5	F
3	G
1	K 0
3	K 2
2	K 5
1	K

Tab. C ($c = -0.5$)

m'	8	9	10	11	12	13	> 13.5
n	3	8	15	16	6	5	2

131.

Pl. 23.
 $\alpha = 18^h 25^{m.8}$
 $\delta = -19^\circ 19'$

M-e 204 (Not in *N. G. C.*).

A large, very irregular cl. with unequal dispersion of the stars: at the centre are two dense star accumulations.

GD_{12} F. A. C. 86

$n = 12.0$

$a = 113$

$I\ II\ T\ III$

$d = 57-68$

$n = 181\ n_A = 7$

$n_F = 2\ n_K = 3$

TAB. A.

α	δ	m	m'	Sp.
$18^h 25.^m 6$	$-19^\circ 14'$	8.6	7.8	$B\ 8$
25.8	9	8.20	8.2	$B\ 9$
24.5	27	9.1	9.0	"
26.4	17	9.1	9.0	["]
26.4	20	9.4	9.3	"
26.5	10	10.1	9.6	"
23.8	40	9.1	9.4	$A\ 0$
27.5	34	10.1	9.6	["]
25.6	3	9.9	9.4	$A\ 5$
24.0	35	9.1	10.2	$F\ 8$
26.0	12	var.	var.	"
25.5	$18\ 58$	6.98	7.98	$K\ 0$
26.6	$19\ 2$	7.70	8.1	["]
26.3	11	7.33	8.8	$K\ 2$
26.6	32	8.9	9.6	"

TAB. B.

n	Sp.	n	Sp.
1	$B\ 3$	3	$F\ 0$
1	$B\ 5$	3	$F\ 5$
5	$B\ 8$	1	$F\ 8$
10	$B\ 9$	2	F
1	B	10	G
16	$A\ 0$	10	$K\ 0$
3	$A\ 2$	4	$K\ 2$
1	$A\ 3$	7	$K\ 5^*$
3	$A\ 5$	2	M
10	A		

N. G. C. 6645 (M-e 205).

A distinctly prominent cl. well separated from the surroundings and consisting of exclusively rather feeble stars. Here, as in some other cases, a nearly starless centre surrounded by a dense halo is to be noted. The dispersion at the outer parts uneven. No stars in D. C.

132.

Pl. 23.

$\alpha = 18^h 26.^m 8$

$\delta = -16^\circ 58'$

GD_{12} F. A. C. 86

$\bar{n} = 20.2\ a = 101$

$I\ II\ T\ III$

$d = 16-19$

$n = 88$

N. G. C. 6649 (M-e 206).

A very peculiar cl. with regard to its position: falling in a very thin region, it is, of course, distinctly separated from the environs. Regular form. No stars in D. C.

133.

Pl. 16.

$\alpha = 18^h 27.^m 9$

$\delta = -10^\circ 28'$

GD_{12} F. A. C. 86

$\bar{n} = 1.5\ a = 121$

$I\ II\ T\ I$

$d = [8]\ n = 34$

N. G. C. 6664 (M-e 209).

An extremely thin cl., yet clearly separated from the surroundings which are here very thin. Very irregular in form. No perceptible concentration. No stars in D. C.

134.

Pl. 17.

$\alpha = 18^h 31.^m 3$

$\delta = -8^\circ 18'$

GD_{12} F. A. C. 87

$\bar{n} = 2.6\ a = 142$

$I\ III\ T\ IV$

$d = 20-24$

$n = 62$

M-e 210 (Not in N. G. C.)

A very thin, not well defined cl., which imperceptibly passes into the surroundings. No condensation is to be found.

135.

Pl. 24.

$\alpha = 18^h 34.^m 0$

$\delta = +5^\circ 22'$

GD_1 F. A. C. 111

$\bar{n} = 3.1$ $a = 116$

I II *T* IV

$d = 70-84$

$n = 129$ $n_A = 3$

$n_G = 1$

TAB. A.

α	δ	m	m'	Sp.
$18^h 32.^m 9$	$+5^\circ 47'$	6.64	6.59	<i>B</i> 8
32.7	27	9.1	9.1	[<i>B</i> 9]
35.5	56	9.1	9.1	[<i>A</i> 0]
32.6	56	9.2	9.2	,
34.2	30	9.2	9.2	,
33.2	16	9.7	9.7	[,]
33.7	23	8.7	8.8	[<i>A</i> 2]
34.7	10	6.30	6.86	<i>G</i> 0p

TAB. B.

n	Sp.	n	Sp.
1	<i>B</i> 5	3	<i>A</i> 5
5	<i>B</i> 8	18	<i>F</i>
11	<i>B</i> 9	9	<i>G</i> 0
34	<i>A</i> 0	5	<i>G</i> 5
15	<i>A</i> 2	38	<i>K</i>
4	<i>A</i> 3		

TAB. C ($c = -1.90$).

m'	7	8	9	10	11	12	> 12.5
n	5	8	21	29	23	13	30

N. G. C. 6694. M. 26 (M-e 212).

A clearly prominent cl. with extremely great concentration. The outer parts rather thin. The dense centre, whose diameter is $= 5'$, seems to be split into two halves, one consisting of bright stars, the other of feebler ones. Regular in form. No stars in D. C.

136.

Pl. 17.

$\alpha = 18^h 39.^m 8$

$\delta = -9^\circ 30'$

GD_{12} F. A. C. 87

$\bar{n} = 6.5$ $a = 106$

I III *T* I

$d = 14-16$

$n = 45$

N. G. C. 6709 (M-e 214).

An exceptionally sharply defined but irregular cl. with two offshoots. Fairly dense; equal distribution at the centre. The two brightest stars falling in this cl. lie close together very far from the centre. It is possible that they do not belong to the cl., since stars of the same size are to be found in a rather large number in the environs. At the very centre are no particularly bright stars.

137.

Pl. 24.

$\alpha = 18^h 46.^m 8$

$\delta = +10^\circ 14'$

GC_1 F. A. C. 135

$\bar{n} = 9.4$ $a = 85$

I II *T* IV

$d = 20-24$

$n = 51$ $n_A = 2$

TAB. A.

α	δ	m	m'	Sp.
$18^h 46.^m 9$	$+10^\circ 12'$	8.89	8.89	<i>A</i> 0
46.8	12	9.7	9.7	,

TAB. B.

n	Sp.	n	Sp.	n	Sp.
1	<i>B</i>	1	<i>A</i>	3	<i>K</i>
5	<i>A</i> 0	1	<i>F</i>	2	<i>Ma</i>
2	<i>A</i> 3	1	<i>G</i>		

TAB. C ($c = -1.4$).

m'	9	10	11	12	13	>13.5
n	2	4	7	10	15	13

N. G. C. 6811 (M-e 222).

A very thin cl., containing exclusively faint stars.

138.

Pl. 17.

$\alpha = 19^h 35^m$

$\delta = +46^\circ 20'$

GC_2 F. A. C. 179

$\bar{n} = 3.2$ $a = 66$

I II T I

$d = 19-23$

$n = 42$

TAB. C ($c = -2.3$).

m'	11	12	13	>13.5
n	5	15	17	5

N. G. C. 6819 (M-e 223).

Consists of 8 or 9 faint stars which are shown rather indistinctly on the chart. Rather concentrated.

139.

$\alpha = 19^h 37^m$

$\delta = +39^\circ 57'$

GC_2 F. A. C. 179

$\bar{n} = 2.8$ $a = 93$

I II T I

$d = [6]$ $n = 9$

TAB. C ($c = -2.3$).

m'	11	12	13	>13.5
n	1	3	4	1

N. G. C. 6823 (Not in M-e).

A small, not well defined cl. with exclusively faint stars. No stars in D. C.

140.

Pl. 17.

$\alpha = 19^h 38^m$

$\delta = +23^\circ 4'$

GD_1 F. A. C. 160

$\bar{n} = 4.6$ $a = 124$

I II T I

$d = [6]$ $n = 28$

TAB. C ($c = -0.9$).

m'	11	12	13	14	>14.5
n	1	1	3	7	16

N. G. C. 6830 (M-e 224).

A very irregular, fairly thin cl. which fades quite imperceptibly into the environs. The brighter stars lie rather eccentrically. No marked concentration. The diameter difficult to determine.

141.

$\alpha = 19^h 46^m$

$\delta = +22^\circ 50'$

GD_1 F. A. C. 160

$\bar{n} = 5.0$ $a = 115$

I II T III

$d = 15-18$

$n = 40$

TAB. C ($c = -0.9$).

m'	11	12	13	14	>14.5
n	1	4	5	8	22

N. G. C. 6834 (M-e 225).

142.

Pl. 18.

$$\alpha = 19^h 48.^m 2$$

$$\delta = + 29^\circ 9'$$

GC_2 F. A. C. 160

$$n = 10.6 \quad a = 36$$

I II T II

$$d = [10] \quad n = 46$$

A very small, fairly regular, dense, well concentrated cl. of exclusively faint stars. Melotte's estimation of the diameter (4') is probably too low. A couple — the brightest — of the stars at the centre do not, as calculation shows, belong to this cl.

TAB. C ($c = -0.9$).

m'	13	14	> 14.5
n	3	7	36

N. G. C. 6866 (M-e 229).

143.

Pl. 18.

$$\alpha = 20^h 0.^m 5$$

$$\delta = + 43^\circ 43'$$

GC_2 F. A. C. 179

$$\bar{n} = 4.1 \quad a = 15$$

I I T II

$$d = 22-26$$

$$n = 50$$

Fairly circular form; well concentrated. Distinctly separated from the environs. As regards the size of the diameter, I am somewhat uncertain. At a slight examination one estimates it, as Melotte has done, at 6' or 7'. A portion of the stars in the environs, however, belongs no doubt to the cl., as calculation plainly shows.

TAB. C ($c = -2.3$).

m'	10	11	12	13	> 13.5
n	3	7	11	18	11

N. G. C. 6939 (M-e 231).

144.

$$\alpha = 20^h 29.^m 4$$

$$\delta = + 60^\circ 18'$$

GC_3 F. A. C. 195

Not distinctly shown on the chart.

N. G. C. 6940 (M-e 232).

145.

Pl. 24.

$$\alpha = 20^h 30.^m 4$$

$$\delta = + 27^\circ 58'$$

GD_2 F. A. C. 161

$$\bar{n} = 1.9 \quad a = 97$$

I III T I

$$d = 27-33$$

$$n = 82.$$

The pictures on the chart being deformed, the determination of the magnitudes is doubtful. The distribution fairly unequal. Rather distinct concentration.

TAB. C ($c = -1.5$).

m'	11	12	13	14	> 14.5
n	5	7	21	43	6

N. G. C. 7209 (M-e 238).

146.
Pl. 25.
 $\alpha = 22^h 1.^m 2$
 $\delta = +46^\circ 0'$
 GD_3 F. A. C. 181
 $\bar{n} = 6.6$ $a = 102$
I III T II
 $d = 36-43$
 $n = 82$

The pictures on the chart a little rough at the edges. A very fine example of a cl. containing many stars of about the same magn. (11—13 magn.). Rather sharply defined and nearly circular. No marked concentration; the stars lie almost as thickly at the outlines as at the centre.

TAB. C ($c = -1.0$).

m'	8	9	10	11	12	13	> 13.5
n	2	3	7	8	9	10	43

M-e 239 (Not in *N. G. C.*).

Not well defined. Contains exclusively faint stars.

147.
 $\alpha = 22^h 6.^m 7$
 $\delta = +52^\circ 20'$
 GD_3 F. A. C. 196
 $\bar{n} = 4.1$ $a = 118$
I II T II
 $d = [6]$ $n = 20$

TAB. C ($c = -1.1$).

m'	12	13	> 13.5
n	1	4	15

N. G. C. 7243 (M-e 240).

Very irregular in form; seems almost divided into one larger and one smaller part, the former of which contains about twice as many stars as the latter. There appear three stars of the 8th magn. (corr.) one of which should be eliminated.

148.
Pl. 25.
 $\alpha = 22^h 11.^m 3$
 $\delta = +49^\circ 23'$
 GD_3 F. A. C. 181
 $\bar{n} = 6.4$ $a = 98$
I II T IV
 $d = 22-26$
 $n = 37$

TAB. C ($c = -1.0$).

m'	8	9	10	11	12	13	> 13.5
n	2	2	3	6	6	12	6

N. G. C. 7245 (M-e 241).

Not distinctly shown on the chart.

149.
 $\alpha = 22^h 11.^m 5$
 $\delta = +53^\circ 50'$
 GD_3 F. A. C. 196

N. G. C. 7654. M. 52 (M-e 243).

Rather peculiar example. In the north half which is extremely sharply defined lie the brightest stars crowded very close together; in the south half, the fainter stars are more thinly dispersed*. There is hardly any other example of such a distribution.

150.
Pl. 18.
 $\alpha = 23^h 19.^m 8$
 $\delta = +61^\circ 3'$
 GC_3 F. A. C. 182

* Melotte maintains the contrary.

$\bar{n} = 6.3$ $a = 100$ According to what calculation shows, no brighter stars than of
I II T I 10.9 (corr.) would belong to the cl. In the dense crowd lie a
 $d = 17-21$ couple of stars of $m = 9.2$ and 9.8 which possibly also belong
 $n = 81$ to this cl.

TAB. C ($c = -1.1$).

m'	11	12	13	14	> 14.5
n	6	9	11	33	22

N. G. C. 7762 (M-e 244).

Not shown on the chart.

151.

$\alpha = 23^h 45^m 0$

$\delta = + 67^\circ 28'$

*GC*₃ F. A. C. 182

N. G. C. 7789 (M-e 245).

A regular cl., containing exclusively very faint stars.

152.

Pl. 18.

$\alpha = 23^h 52^m 0$

$\delta = + 56^\circ 10'$

*GD*₃ F. A. C. 182

$\bar{n} = 2.8$ $a = 55$

I II T I

$d = 46-55$

$n = 174$.

TAB. C ($c = -1.5$).

m'	11	12	13	14	> 14.5
n	5	7	26	136	0

Chapter IV.

Absolute magnitude: In astronomical literature there are no less than three different definitions of the absolute magn. This difference is due to the choice of the size of the distance at which the apparent magnitude of a star is put equal to the absolute magnitude. These three distances are:

1	sirio	meter	corresponding	to	$\pi = 0.''_{206}$
0.206	»	»	»	»	$\pi = 1.''$
2.06	»	»	»	»	$\pi = 0.1$

Like Charlier in L. M. II: 19, I denote the corresponding absolute magnitudes by M , M_1 , and $M_{0.1}$.

We then have the following relations:

$$\begin{aligned} M &= M_1 + 3.43 \\ M &= M_{0.1} - 1.57 \end{aligned}$$

In this research, the absolute magnitude, as is the case in all researches made at the Lunds Observatory, is referred to the sirio-meter as unit for the distance. The denotation M will be used everywhere.

This chapter is chiefly devoted to determining the distance (r) of the star cluster in as many cases as possible. The spectral classes which I have almost exclusively used for this purpose are the groups $B0 - B5$, which I call B-stars, and $B8 - A5$, which I call A-stars.

Let us now first discuss the use of the B-stars in determining the distance. In many cases we find in D. C. only a small number (the brightest stars) belonging to the B type. In this case I have proceeded in the following way: I have taken the mean of their magnitudes ($\bar{m}$) and simply used the well-known formula: $5 \log r = \bar{m} - M_0$. Now the question is, which value should be chosen for the absolute magnitude of the B-stars? I have resolved upon choosing the value $M_0 = -2.6^*$, which, as shown by Charlier's research L. M. II: 14, holds good for the subclasses $B0$, $B3$ and $B5$. Charlier has also obtained the values $M_0 = -3.4$

* as soon as only one or two very bright B-stars of about the same magnitude are known from D. C.

(for the bright B-stars) and $M_0 = -2.7$ (for the faint stars). I have been hesitating between the values -3.4 and -2.6 , but decided for the latter for reasons made evident by the following research.

Charlier's value -2.6 is based on the presumption that the dispersion in the absolute magn. of the B-stars $= 0$. Then it may be of interest to show how a presumed dispersion σ influences this value.

Let us suppose the number of stars down to a certain apparent magnitude to be

$$A(m) = C \cdot e^{b \cdot \nu \cdot m}, \text{ where } b = 0.2 \times \text{Mod.} = 0.46052$$

or

$$A(m) = C \cdot 10^{0.2 \nu \cdot m}$$

Then we get:

$$\frac{A(m+1)}{A(m)} = 10^{0.2\nu}$$

From Charlier's research on the B-stars (l. c.) we find:

$$A(5) = 153 \text{ and } A(6) = 364.$$

Accordingly

$$\frac{A(6)}{A(5)} = 10^{0.2\nu} = \frac{364}{153}$$

This equ. gives $\nu = 1.88$.

We can now apply the following formula, given by Malmquist*.

$$\left(\frac{\bar{1}}{R}\right) = e^{\frac{bM_0 + \frac{1}{2}b^2\sigma^2}{-\infty, m}} \cdot \frac{A(m - b\sigma^2)}{A(m)},$$

where R denotes the distance at which the star in question would have an apparent magnitude equal to 0. But according to our presumption we have:

$$\frac{A(m - b\sigma^2)}{A(m)} = e^{-\nu b^2\sigma^2}$$

Accordingly

$$\left(\frac{\bar{1}}{R}\right) = e^{\frac{bM_0 + \frac{1}{2}b^2\sigma^2 - \nu b^2\sigma^2}{\infty, m}}$$

or:

$$\left(\frac{\bar{1}}{R}\right) = e^{\frac{bM_0 - b^2\sigma^2(\nu - 0.5)}{-\infty, m}} = e^{\frac{bM_0 - b^2\sigma^2 \cdot 1.38}{-\infty, m}}$$

* L. M. II: 22

Charlier has now supposed that:

$$\left(\frac{\bar{1}}{R}\right) = \frac{1}{(\bar{R})} = \frac{1}{R_0} = e^{bM}$$

$$(\text{for } R = 10^{-0.2 \cdot M})$$

A comparison will now give:

$$\frac{bM}{e} = \frac{bM_0 - b^2\sigma^2 \cdot 1.38}{e}$$

or

$$M = M_0 - 0.635 \cdot \sigma^2.$$

In his research on Moving Clusters L. M. II: 26, N. Rasmuson, in another way, has found the absolute magn. of the B-stars to be -2.02 . If we put $M = -2.6$ and $M_0 = -2.02$ the last equ. gives

$$\sigma = 0.955$$

Kapteyn has in Ap. J. Vol. 47 obtained $\sigma = 1.600$, a value, which certainly is far too great. The value of $\sigma = 0.955$ is possibly also too great, but it brings Rasmuson's value into accordance with Charlier's. I have now resolved on proceeding in the following way, if a greater number of B-stars extending over one or even two magnitudes within the cluster are given in D. C. I use the formula $5 \log r = \bar{m} - M_0$ and put the value $M_0 = -2.02$, which I think very appropriate since also fainter B-stars are now taken into consideration. So great a number of B-stars are never given in D. C. that I have considered it appropriate to use Kapteyn's formula.

In using the A-stars B 8—A 9 for the determination of r with the help of Kapteyn's formula, I have, without any hesitation, adopted the values $M_0 = -0.2$ and $\sigma = 0.9$, (obtained by Malmquist in L. M. II: 22), which are of a recent date and are based on the largest material.

We now come to a matter of the greatest importance. The question is to ascertain how large a part of the stars of different magnitudes within a cluster are A-stars. First I will point out that the number of A-stars of the brightest stars (about two magnitudes) obtained from D. C. within the cluster is overwhelmingly large, without doubt 80 per cent in general. If we proceed to the 4th magnitude the percentage of the A-stars diminishes rather strongly, which, however, is not clearly seen from the number of A-stars found in D. C., as D. C. is incomplete as soon as we go beyond $m = 8.5$ or 9.0 for the northern sky and $m = 9.0$ or 9.5 for the southern sky.

As a proof of the decrease in the number of the A-stars of fainter magnitudes, I will adduce how matters stand for $M .37$ (N. G. C. 2099).

The figures are taken from the above-mentioned memoir of v. Zeipel. We there find that out of 20 stars ($9.5 < m' < 11.5$) 10 are A-stars, which makes only 50 per

cent (an unusually low value); out of 140 stars ($11.5 < m' < 12.5$) 112 are A-stars, which makes 80 per cent; out of 263 stars ($12.5 < m' < 13.5$) 172 are A-stars, which makes 65.4 per cent; out of 418 stars ($13.5 < m' < 14.5$) 220 are A-stars, which makes 52.6 per cent*.

As *M* 37 may be considered a typical example of large star clusters, with which this chapter chiefly deals, I think I am justified in using the above-mentioned results. Thus in the case of a large star cluster (with δ positive) I first presume that D. C. is complete down to 8.5. I then generally get the first two magnitudes. For the next magnitude down to 9.5, D. C. is not complete, so I fill up the number by adding so many stars from my own star counts that the number of these together with the D. C. stars form 80 per cent of the total number of stars of this magnitude. I proceed in the same way in the next magnitude (down to 10.5), (only few stars of this magnitude are in general to be got from D. C.). In this case I take 65 per cent. In this way I get the number of A-stars within three magnitudes and can now obtain generally two values of the distance.

When we come to the southern sky, the material is smaller, since, as already pointed out, I have no corrected magnitudes for this area at my disposal. This is, however, partly compensated by the fact that D. C. is regarded by Shaply** as complete at least down to $\bar{m} = 8.75$; I have, in most cases, been able to extend as far as $m = 9.5$.

In consideration of the results obtained by Malmquist (l. c. pag. 53 and 54) one might even regard D. C. as practically complete for A-stars down to 9.0, possibly down to 9.5. For Zone I he has there found the observed and the computed numbers equal down to $m = 9.05$ and pretty nearly equal down to 9.55. For Zone II the accordance is good down to 9.05. In these facts I find a good support for using D. C.-stars down to 9.5.

As mentioned before, I have not had any corrected magnitudes for the southern sky at my disposal, and therefore I have not been able to complete the numbers within the different magnitudes, as I have been able to do in the case of the northern sky.

I will now describe more precisely the determination of the distance of star clusters and divide the research into two parts, one comprising star clusters in the northern sky, in treating which I have had corrected magnitudes at my disposal, the other comprising star clusters in the southern sky, for which I have exclusively used D. C.-stars.

I have tried to make these accounts as brief as possible. The tables included in most of them give the numbers of the stars from my counts (Tab. C.), which I thought should be regarded as A-stars (using the percentages 80, 65 and 52),

* Similar observations are to be made in the moving clusters (for instance the Taurus cluster).

** Harvard Circular 226.

after excluding the stars found in D. C., the number and interval of magnitude of which I have especially given.

I think it appropriate to recapitulate the final formulae belonging to Kapteyn's formula:

$$\frac{m_1 - \bar{m}}{\sigma} = x_1 + \frac{p(x_1)}{Q(x_1)} = F(x_1)$$

$$\log r = \frac{m_1 - M_0 - \sigma \cdot x_1}{5}$$

I will now proceed to the particular accounts:

Remark: In determining the mean value of r I have only used the values of r obtained by A-stars. I have not considered it convenient to use the values obtained by the B-stars because of the great uncertainty in their absolute magnitude.

A. Clusters in the Northern Sky.

N. G. C. 457.

There are no A-stars belonging to this cl. in D. C.

I obtain, however, from Tab. C the following A-stars:

m'	10	11	12	13
n	4	4	5	5

1) Down to $m_1 = 12.5$ we get 13 stars with $\bar{m} = 11.077$ and

$$r_1 = 192.2 \text{ sir.}$$

2) We go down to $m_1 = 13.5$ and obtain 18 stars with $\bar{m} = 11.611$

$$r_2 = 235.1 \text{ sir.}$$

The mean value of the distance thus becomes

$$r = 213.6 \pm 21.4 \text{ sir.}$$

$$\text{and } \pi = 0.''00097.$$

N. G. C. 663.

In this case I have not any D. C.-stars at my disposal.

From Tab. C I obtain the following series:

m'	9	10	11	12	13
n	1	2	6	5	4

1) To $m_1 = 12.5$ there are 14 stars with $\bar{m} = 11.071$. They give

$$r_1 = 191.5 \text{ sir.}$$

2) To $m_1 = 13.5$ we get 18 stars with $\bar{m} = 11.500$. In this case we get

$$r_2 = 222.2 \text{ sir.}$$

$$\text{Thus } r = 206.8 \pm 15.3 \text{ sir. and } \pi = 0.''0010.$$

N. G. C. 752.

Only one D. C.-star ($m=8,1$) is noted

Tab. C gives us

m'	9	10	11
n	9	19	8

1) We have 29 stars to $m_1=10.5$. As $\bar{m}=9.624$, we get

$$r_1 = 115.8 \text{ sir.}$$

2) There are 37 stars to $m_1=11.5$. They give $\bar{m}=9.922$ and

$$r_2 = 110.7 \text{ sir.}$$

$$r = 113.2 \pm 2.5 \text{ sir. and } \pi = 0.''0018.$$

N. G. C. 869.

1) From D. C. I have obtained 9 B-stars ($6.42 \leq m \leq 9.0$) with $\bar{m}=7.85$ and got through the equ. 5 $\log r = 7.85 + 2.02$

$$r_1 = 94.2 \text{ sir.}$$

2) D. C. has given me 4 A-stars ($8.0 \leq m \leq 9.7$).

Further I have obtained from Tab. C the following series of

A-stars:

m'	8	9	10	11
n	5	17	17	21

To $m_1=10.5$ I get 43 A-stars with $\bar{m}=9.281$. I obtain

$$r_2 = 87.4 \text{ sir.}$$

3) To $m_1=11.5$ the number of the stars becomes 64 and $\bar{m}=9.845$. I get

$$r_3 = 106.0 \text{ sir.}$$

The mean value of r_2 and r_3 becomes

$$r = 96.7 \pm 9.8 \text{ sir. and } \pi = 0.''0021.$$

N. G. C. 884.

Four B-stars ($\bar{m}=35.9$) give $r=158.1$ sir. ($M_0=-2.02$).

Eight A-stars are to be found in D. C. ($6.95 \leq m \leq 9.7$).

From Tab. C I get the following series of A-stars:

m'	8	9	10	11
n	1	15	27	14

1) I go down to $m_1=10.5$. There are, in all, 51 stars with $\bar{m}=9.499$. They give

$$r_1 = 98.2 \text{ sir.}$$

2) Down to $m_1=11.5$ the number of the stars becomes 65 with $\bar{m}=9.775$. They give

$$r_2 = 102.0 \text{ sir.}$$

$$r = 100.1 \pm 1.9 \text{ sir. and } \pi = 0.''0021.$$

M-e 15.

No stars are to be noted from D. C.

We get from Tab. C

m'	9	10	11	12
n	3	4	6	2

1) To $m_1 = 11.5$ we get 13 stars with $\bar{m} = 10.231$ and

$$r_1 = 133.8 \text{ sir.}$$

2) If we go down to $m_1 = 12.5$ we get 15 stars with $\bar{m} = 10.467$ and

$$r_2 = 137.9 \text{ sir.}$$

Thus $r = 135.8 \pm 2.0$ sir. and $\pi = 0.''0015$.

N. G. C. 1027.

No stars from D. C.

We get from Tab. C

m'	9	10	11	12
n	1	2	3	4

1) To $m_1 = 11.5$ we get 6 stars with $\bar{m} = 10.333$. They give $r_1 = 143.7$ sir.

2) To $m_1 = 12.5$ we obtain 10 stars with $\bar{m} = 11.0$ and $r_2 = 183.4$ sir.

Thus: $r = 163.6 \pm 19.9$ sir. and $\pi = 0.''0013$.

N. G. C. 1039.

D. C. gives us 11 A:stars ($7.8 \leq m \leq 9.3$).

We obtain from Tab. C the following series:

m'	9	10	11	12
n	2	6	9	9

1) We get to $m_1 = 10.5$, in all, 19 stars with $\bar{m} = 8.931$. They give us

$$r_1 = 70.2 \text{ sir.}$$

2) We go further to $m_1 = 11.5$. We find 9 new stars. Thus, in all, 28 stars with $\bar{m} = 9.596$, which give us

$$r_2 = 92.8 \text{ sir.}$$

3) We find to $m_1 = 12.5$ 37 stars with $\bar{m} = 10.181$.

$$r_3 = 120.0 \text{ sir.}$$

Thus: $r = 94.3 \pm 14.4$ sir. and $\pi = 0.''0022$.

N. G. C. 1342.

One star from D. C. with $m = 8.8$.

We obtain from Tab. C

m'	10	11	12
n	6	5	3

1) We find, to $m_1 = 11.5$, 12 stars with $\bar{m} = 10.317$ which give

$$r_1 = 142.1 \text{ sir.}$$

2) To $m_1 = 12.5$ we obtain 15 stars with $\bar{m} = 10.653$ and

$$r_2 = 151.5 \text{ sir.}$$

$$r = 146.8 \pm 4.7 \text{ sir. and } \pi = 0.''0014.$$

N. G. C. 1528.

Here we have two D. C.-stars ($m = 8.7$ and 8.9).

We obtain from Tab. C

m'	10	11	12
n	4	6	3

1) We go down to $m_1 = 11.5$ and obtain 12 stars with $\bar{m} = 10.300$ and

$$r_1 = 140.4 \text{ sir.}$$

2) To $m_1 = 12.5$ we get 15 stars, and $\bar{m}$ becomes 10.640 .

$$r_2 = 150.5 \text{ sir.}$$

$$r = 145.4 \pm 5.0 \text{ sir. and } \pi = 0.''0014.$$

N. G. C. 1647.

From D. C. I get 3 A-stars ($8.4 \leq m \leq 9.3$).

From Tab. C:

m'	9	10	11
n	5	5	4

1) To $m_1 = 10.5$ we get 13 stars with $\bar{m} = 9.315$ and

$$r_1 = 89.5 \text{ sir.}$$

2) To $m_1 = 11.5$ the number of the stars becomes 17, and we get $\bar{m} = 9.712$ and

$$r_2 = 98.6 \text{ sir.}$$

$$\text{Thus: } r = 94.0 \pm 4.5 \text{ sir. and } \pi = 0.0022.$$

N. G. C. 1664.

We get only one star from D. C. ($m = 8.9$).

Tab. C gives us the following series:

m'	9	10	11	12
n	1	3	6	6

1) To $m_1 = 11.5$ we get 11 stars with $\bar{m} = 10.355$. This gives us

$$r_1 = 146.1 \text{ sir.}$$

2) To $m_1 = 12.5$ the number of the stars becomes 17. We get $\bar{m} = 10.935$ and

$$r_2 = 176.7 \text{ sir.}$$

$$r = 161.4 \pm 15.3 \text{ sir. and } \pi = 0.''0013.$$

N. G. C. 1746.

Only one A-star is to be noted from D. C. ($m=8.8$).

From Tab. C:

m'	9	10	11	12
n	4	6	5	5

1) The number of stars to $m_1=11.5$ becomes 16 with $\bar{m}=9.988$. We get

$$r_1 = 114.9 \text{ sir.}$$

2) If we go down to $m_1=12.5$, we can obtain 21 stars, $\bar{m}$ becomes 10.467 and

$$r_2 = 137.9 \text{ sir.}$$

$$r = 126.4 \pm 11.5 \text{ sir. and } \pi = 0.''0016.$$

N. G. C. 1807.

In this case we have 2 D. C.-stars to our disposal ($m=10.4$).

From Tab. C we get

m'	11	12	13
n	5	5	10

1) To $m_1=12.5$ we get 12 stars with $\bar{m}=11.317$ and

$$r_1 = 225.2 \text{ sir.}$$

2) To $m_1=13.5$ we get 22 stars which give $\bar{m}=12.082$ and

$$r_2 = 305.4 \text{ sir.}$$

$$\text{Thus: } r = 265.3 \pm 40.1 \text{ sir. and } \pi = 0.''00078.$$

N. G. C. 1817.

We get 2 A-stars from D. C. ($m=9.7$).

Tab. C gives us the following series:

m'	10	11	12	13
n	1	4	10	15

1) To $m_1=12.5$ we get 17 stars with $\bar{m}=11.376$ and

$$r_1 = 235.1 \text{ sir.}$$

2) To $m_2=13.5$ the number becomes 32. We obtain $\bar{m}=12.138$ and

$$r_2 = 316.4 \text{ sir.}$$

$$\text{Thus: } r = 275.8 \pm 40.7 \text{ sir. and } \pi = 0.''00075.$$

N. G. C. 1893.

From D. C. no stars. From Tab. C I get:

m'	9	11	12	13
n	1	2	6	4

1) To $m_1 = 12.5$ we get 9 stars with $\bar{m} = 11.444$. We obtain

$$r_1 = 248.0 \text{ sir.}$$

2) To $m_1 = 13.5$ the number becomes 13 and $\bar{m} = 11.923$

$$r_2 = 278.1 \text{ sir.}$$

$$r = 263.0 \pm 15.0 \text{ sir. and } \pi = 0.''00078.$$

N. G. C. 1912.

Two stars from D. C. ($m = 8.7$ and 9.5).

From Tab. C:

m'	8	10	11	12
n	1	5	7	12

1) To $m_1 = 11.5$ I get 15 stars and $\bar{m} = 10.213$. I obtain

$$r_1 = 132.2 \text{ sir.}$$

2) To $m_1 = 12.5$ the number becomes 27 and $\bar{m} = 11.007$. That gives

$$r_2 = 184.2 \text{ sir.}$$

$$r = 158.2 \pm 26.0 \text{ sir. and } \pi = 0.''0013.$$

N. G. C. 1960.

No stars are to be noted from D. C.

From Tab. C:

m'	9	10	11	12
n	2	6	6	7

1) To $m_1 = 11.5$ we get 14 stars with $\bar{m} = 10.286$ and

$$r_1 = 139.0 \text{ sir.}$$

2) To $m_1 = 12.5$ we obtain 21 stars and $\bar{m} = 10.857$ and

$$r_2 = 169.1 \text{ sir.}$$

$$\text{Thus } r = 154.0 \pm 15.0 \text{ sir. and } \pi = 0.''0013.$$

N. G. C. 2099. M. 37.

No stars in D. C.

From Tab. C:

m'	11	12	13
n	10	82	97

We obtain to $m_1 = 13.5$ 189 stars with $\bar{m} = 12.460$.

We get

$$r = 397.9 \text{ sir. and } \pi = 0.''00052.$$

N. G. C. 2168.

We obtain from D. C. 6 A-stars ($8.5 \leq m \leq 10.0$).

Tab. C gives us

m'	8	9	10	11
n	2	14	23	20

1) To $m_1 = 10.5$ we obtain 45 stars whose $\bar{m} = 9.511$. We get

$$r_1 = 104.4 \text{ sir.}$$

2) To $m_1 = 11.5$ the number of the stars becomes 65. We get $\bar{m} = 9.969$ and

$$r_2 = 113.7 \text{ sir.}$$

$$r = 109.0 \pm 4.7 \text{ sir. and } \pi = 0.''0019.$$

N. G. C. 2281.

I obtain from D. C. 3 A-stars ($8.6 \leq m \leq 9.2$).

Tab. C gives me

m'	10	11	12
n	4	5	3

1) Down to $m_1 = 11.5$ we obtain 12 stars whose $\bar{m} = 10.15$. We get

$$r_1 = 126.9 \text{ sir.}$$

2) To $m_1 = 12.5$ we get 15 stars with $\bar{m} = 10.52$. That gives

$$r_2 = 141.6 \text{ sir.}$$

$$r = 134.2 \pm 7.3 \text{ sir. and } \pi = 0.''0015.$$

N. G. C. 2301.

Here we obtain 3 stars from D. C. ($8.3 \leq m \leq 9.3$).

Tab. C gives us

m'	9	10	11	12
n	1	5	5	6

1) If we go down to $m_1 = 11.5$ we can obtain 14 stars. $\bar{m}$ becomes 10.021 and

$$r_1 = 117.2 \text{ sir.}$$

2) To $m_1 = 12.5$ we can obtain 20 stars with $\bar{m} = 10.615$ and

$$r_2 = 148.7 \text{ sir.}$$

$$r = 133.0 \pm 15.8 \text{ sir. and } \pi = 0.''0016.$$

N. G. C. 2632. Præsepe.

1) From D. C. I obtain 16 A-stars ($6.3 \leq m \leq 8.5$).

I get $\bar{m} = 7.368$ and $m_1 = 8.5$ and

$$r_1 = 37.0 \text{ sir.}$$

2) Further I have 13 stars ($8.5 \leq m \leq 9.5$). Also, in all, 29 A-stars ($\bar{m} = 8.025$; $m_1 = 9.5$). I obtain

$$r_2 = 46.8 \text{ sir.}$$

and

$$r = 41.9 \pm 4.9 \text{ sir. and } \pi = 0.''0049.$$

N. G. C. 2682.

No stars from D. C.

Tab. C gives us

m'	8	10	11	12
n	1	3	6	8

1) To $m_1 = 11.5$ we get 10 stars with $\bar{m} = 10.400$ and

$$r_1 = 151.1 \text{ sir.}$$

2) To $m_1 = 12.5$ we obtain 18 stars whose $\bar{m} = 11.111$ and

$$r_2 = 196.3 \text{ sir.}$$

$$r = 173.7 \pm 22.6 \text{ sir. and } \pi = 0.''0012.$$

N. G. C. 6633.

From D. C. we get 12 A-stars ($8.12 \leq m \leq 9.4$).

Further from Tab. C:

m'	10	11
n	11	10

1) Down to $m_1 = 10.5$ we obtain 23 stars whose $\bar{m} = 9.457$. That gives us

$$r_1 = 99.7 \text{ sir.}$$

2) Down to $m_1 = 11.5$ the number becomes 33 and $\bar{m} = 9.925$. We get

$$r_2 = 102.8 \text{ sir.}$$

$$\text{Thus } r = 101.2 \pm 1.6 \text{ sir. and } \pi = 0.''0020.$$

M-e 210 (Not in N. G. C.).

D. C. gives us 3 A-stars with $6.64 \leq m \leq 9.2$.

We obtain from Tab. C

m'	8	9	10
n	6	12	15

1) To $m_1 = 9.5$ the number of the stars becomes 21 and $\bar{m} = 8.621$. We get

$$r_1 = 72.8 \text{ sir.}$$

2) Down to $m_1 = 10.5$ we obtain 36 stars with $\bar{m} = 9.196$. We get

$$r_2 = 82.5 \text{ sir.}$$

and

$$r = 77.6 \pm 4.8 \text{ sir. and } \pi = 0.''0027.$$

N. G. C. 6709.

From D. C. we get 2 A-stars ($m = 8.89$ and 9.7).

Tab. C gives us

m'	10	11	12
n	2	6	7

1) Down to $m_1 = 11.5$ we obtain 10 stars with $\bar{m} = 10.459$. We get

$$r_1 = 158.3 \text{ sir.}$$

2) If we go down to $m_1 = 12.5$, we can obtain 17 stars whose $\bar{m} = 11.094$. That gives

$$r_2 = 194.1 \text{ sir.}$$

$$\text{Thus: } r = 176.2 \pm 17.9 \text{ sir. and } \pi = 0.''0012.$$

N. G. C. 6866.

No stars from D. C.

Tab. C gives us, however,

m'	10	11	12	13
n	2	6	7	9

1) Down to $m_1 = 12.5$ we get 15 A-stars and $\bar{m} = 11.333$. We obtain

$$r_1 = 227.8 \text{ sir.}$$

2) To $m_1 = 13.5$ the number becomes 24 with $\bar{m} = 11.958$.

$$r_2 = 283.7 \text{ sir.}$$

$$r = 255.8 \pm 28.0 \text{ sir. and } \pi = 0.''00081.$$

N. G. C. 7209.

No stars from D. C.

We get from Tab. C

m'	8	9	10	11
n	1	2	6	5

1) The table gives us 9 stars to $m_1 = 10.5$. $\bar{m}$ becomes 9.556 and

$$r_1 = 108.5 \text{ sir.}$$

2) To $m_1 = 11.5$ we get 14 stars with $\bar{m} = 10.071$ and

$$r_2 = 113.1 \text{ sir.}$$

$$r = 110.8 \pm 2.3 \text{ sir. and } \pi = 0.''0019.$$

B. Clusters in the Southern Sky.

N. G. C. 2287.

I have obtained 10 A-stars from D. C. with $6.00 \leq m \leq 9.4$. Thus m_1 becomes 9.4. I get $\bar{m} = 8.580$ and

$$r = 73.9 \text{ sir. and } \pi = 0.''0028.$$

N. G. C. 2422.

D. C. has given me 11 stars ($6.42 \leq m \leq 9.2$). I get $m_1 = 9.2$ and $\bar{m} = 8.311$. The distance becomes

$$r = 62.8 \text{ sir. and } \pi = 0.''0033.$$

N. G. C. 2516.

We get from D. C. 28 stars with $6.41 \leq m \leq 9.42$. We obtain $m_1 = 9.42$ and $\bar{m} = 8.839$ and

$$r = 58.8 \text{ sir. and } \pi = 0.''0035.$$

N. G. C. 2548.

D. C. gives us 8 stars ($8.50 \leq m \leq 9.5$). m_1 becomes 9.5 and $\bar{m} = 9.038$ and

$$r = 135.3 \text{ sir. and } \pi = 0.''0015.$$

N. G. C. 3114.

We get in this case from D. C. 19 A-stars ($8.3 \leq m \leq 9.5$). We obtain $m_1 = 9.5$ and $\bar{m} = 8.969$.

$$r = 116.4 \text{ sir. and } \pi = 0.''0018.$$

M-e 102 (Not in N. G. C.)

D. C. gives us 11 stars ($6.4 \leq m \leq 8.9$). We get $m_1 = 8.9$ and $\bar{m} = 7.309$.

$$r = 33.2 \text{ sir. and } \pi = 0.''0062.$$

N. G. C. 3532.

1) We obtain from D. C. 72 A-stars with $8.0 \leq m \leq 9.5$. We get $m_1 = 9.5$ and $\bar{m} = 8.901$. That gives

$$r_1 = 103.3 \text{ sir.}$$

2) Further we can obtain 23 other stars with $9.5 \leq m \leq 10.0$. We get, in all, 95 stars with $m_1 = 10.0$ and $\bar{m} = 9.122$. We obtain

$$r_2 = 91.7 \text{ sir.}$$

$$r = 97.5 \pm 5.8 \text{ sir. and } \pi = 0.''0021.$$

N. G. C. 6405.

D. C. gives us in this case 8 A-stars ($6.86 \leq m \leq 9.4$). We get $m_1 = 9.4$ and $\bar{m} = 8.275$. We obtain

$$r = 56.4 \text{ sir. and } \pi = 0.''0037.$$

N. G. C. 6475.

From D. C. 50 stars with $5.97 \leq m \leq 9.4$. m_1 becomes 9.4 and $\bar{m} = 7.979$. That gives

$$r = 46.2 \text{ sir. and } \pi = 0.''0045.$$

N. G. C. 6494.

We get from D. C. 6 stars ($6.40 \leq m \leq 9.5$). $m_1 = 9.5$; $\bar{m} = 8.750$. That gives

$$r = 83.7 \text{ sir. and } \pi = 0.''0025.$$

Remark: In these accounts I have not thought it necessary to include the calculation of r with help of the B-stars (excepting N. G. C. 864 and N. G. C. 889 as examples). Instead, I have included the r -values, obtained by B-stars in Tab. III.

After I have finished the account of the determination of the distances of 39 star clusters it may be of interest to compare my values with those obtained by other authors.

Let us first compare with the values found by W. J. Schouten* for N. G. C. 869, 884, 1960, 2099, 2632, 2682. In his computations he has made use of Kapteyn's formula. He has used different star catalogues and included all the stars (accordingly, without excluding stars belonging to the surroundings). Further, he has not restricted himself to A-stars only, but used the frequency curve common to all star classes for which σ and M_0 are very uncertain. The values he has used for these quantities are not indicated in his account. His values for π are throughout larger than mine: for 869 and 884 (h and χ Persei) and 2682 twice as large, and for 1960 and 2099 4 times as large. The greatest divergence shows 2632 (Præsepe). Here Schouten has obtained an improbably large value, $\pi = 0.''024$, 5 times as large as the one obtained by me ($\pi = 0.0049$). Præsepe has been examined by several other astronomers: Rasmuson**: ($\pi = 0.011$) undoubtedly also too large a value; Kohlschütter has found $\pi = 0.''0072$ by comparing the difference in magnitude $2.^m_{51}$ between the Hyades and Præsepe, and the parallax $\pi = 0.''023$ for the Hyades. For Præsepe Schwarzschild has found*** $\pi = 0.''0063$, which pretty nearly agrees with the value obtained by me $\pi = 0.''0051$. A short time ago Hertzsprung† published a value for Praesepe's distance = 167 parsecs, corresponding to $\pi = 0.''0060$. As we have found in this case that Schouten's value is four times as large as the undoubtedly very certain values obtained by Kohlschütter, Schwarzschild and Hertzsprung, it is probable that his other determinations of π should be divided by 3 or 4, which would bring them into good accordance with the values obtained by me.

As to N. G. C. 2099, M. 37, I am in a position to make one more comparison, namely with the parallax-value $0.''00069$ by H. v. Zeipel and J. Lindgren††, which is in pretty good accordance with my own value $0.''00052$. If we apply the value for M. 37's distance, 2200 parsecs, which v. Zeipel has found by using B8—A 5-stars and the value for $M_0 = -0.2$ obtained by Malmquist and used also by me, π will be $= 0.''00045$; which is in pretty good accordance with my own value. As is well known, v. Zeipel did not exclude the stars belonging to the surroundings. In this case I have also proceeded in the same way as v. Zeipel, that is to say in an area as large as the one on v. Zeipel's Chart I have included all stars from my counts and obtained down to $m' = 11.5$ 28 stars, down to 12.5 143 stars,

* A. N. Band 208.

** L. M. II: 26.

*** A. N. Band 196.

† Bulletin of the Astronomical Institutes of the Netherlands, No 25.

†† Kungl. Svenska Vetenskapsakademiens handlingar. Band 61.

down to 13.5 429 stars, the corresponding figures of v. Zeipel being 20, 160, 423, which I have taken from his star-table, not from his table 34, which is based on $m = \frac{1}{2} \cdot (m_{ph} + m_{vis})$. Reducing the above number of stars to A-stars, I get 14, 92, 186, which give $r = 445.6$ sir. and $\pi = 0.''00042$, a value, which pretty nearly agrees with $\pi = 0.''00045$. From this we see that the results differ somewhat according as the stars of the surroundings are excluded or not. Lastly my value $\pi = 0.''00052$ may be compared with the one found by Lundmark* ($\pi = 0.''00055$).

Let us now consider some of the results obtained by Shapley** in his determination of the distances of 70 open star clusters with the help of a parallax-diameter curve established on the basis of measured apparent magnitudes for 14 clusters combined with absolute magnitudes, estimated on the basis of observed colours or spectra. Comparing with Shapley's values we find, if we first turn to Præsepe, his value for $\pi = 0.''003$, that is to say scarcely half as large as the mean value of the values obtained by Kolschütter, Schwarzschild and me. The fact is that his values are throughout from 2 to 4 times less than mine. In the case of M. 37 the accordance is best. Shapley has the value $\pi = 0.0004$. It may be of interest to compare Shapley's value for N. G. C. 1960 ($\pi = 0.0002$) with his value for M. 37 ($\pi = 0.''0004$). If we look at the two star clusters on the plates it is quite improbable that N. G. C. 1960 should be twice as distant as M. 37.

C. Correlation-calculations.

I have thought it suitable to compute some correlations.

The first correlation is between the app. diameter and the mean magnitude of the brightest stars of all classes. In determining the magnitudes, I have taken the mean of the magnitudes of the stars situated within the first, brightest magnitude. From D. C. I have thus got the mean magnitudes ($\bar{m}$) of 58 clusters. In a few cases I have not followed the rule of the mean of the first-magnitude stars. I have excluded for N. G. C. 2204 the star K 0 ($m = 6.24$); for N. G. C. 2287 the star B 8 ($m = 6.0$); for 2353 B 1 ($m = 5.99$); for 2547 B 3 ($m = 6.68$) and for M-e 102 B 0 ($m = 3.03$). As for 2422 I have used the mean of two magnitudes. I have proceeded in this way because of the great discontinuity of magnitudes in these 6 cases.

Secondly I have computed the correlation between the diameter and the mean magnitude of the brightest A-stars which are to be found in D. C. in most of the cases.

Thirdly I have determined the correlation between the diameter and the distance. In this calculation I have included 26 star clusters in the Northern Sky, whose distances are determined with the greatest accuracy.

* Kungl. Svenska Vetenskapsakademiens handlingar. Band 60.

** Communications to the National Academy of sciences, N:o 62.

The correlation-tables follow below with the values of the class-breadth, σ and r (the correlation coefficients), and $\varepsilon(r)$.

That an appreciable correlation exists between the diameter and the brightest stars is to be concluded from correlation Tables I and II, and it is evident from the values of the correlation coefficients $r = 0.57$ and -0.49 resp. We can compare these values with the value obtained by Charlier (l. c.). His value for 55 globular clusters is -0.49 , thus, a little smaller than the first of my own values. This confirms that the correlation between the diameter and the brightest stars is rather small.

As to Correlation III between the diameter and the distance, we find that it is a little greater than the former ($r = 0.68$). This value may be regarded as neither too small nor too large. I have also examined the correlation between the expression $\frac{d}{\sqrt[3]{n}}$ and the distance r (the diameter is proportional to $\sqrt[3]{n}$, if we suppose the density to be equal in the different clusters). I found that the correlation had nearly the same value as in III.

I. Correlation between the apparent diameter and the mean magnitude of the brightest stars of all classes.

Apparent magnitude.

Diameter.		5.1	5.3	5.5	5.7	5.9	6.1	6.3	6.5	6.7	6.9	7.1	7.3	7.5	7.7	7.9	8.1	8.3	8.5	8.7	8.9	9.1	9.3	9.5	9.7	9.9	10.1	Sum
	12-14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	1
	15-17	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	4
	18-20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—	—	2	2	1	—	—	—	—	8
	21-23	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	1	1	—	—	—	1	—	—	6
	24-26	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	1	—	—	—	—	1	—	—	—	—	6
	27-29	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1	1	1	1	—	—	—	—	5
	30-32	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	3	—	—	—	—	—	—	4
	33-35	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	—	—	—	—	1	—	—	—	—	—	3
	36-38	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	39-41	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1	2	—	—	1	1	—	—	—	—	—	6
	42-44	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	3
	45-47	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	2	1	—	—	—	—	—	—	—	4
	48-50	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1	—	—	1	—	—	—	—	3
	51-53	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
	54-56	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	57-59	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
	60-62	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
	63-65	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	66-68	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
69-71	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	
Sum	1	—	—	—	—	2	—	2	1	2	3	1	2	—	6	4	—	5	7	8	7	3	1	1	1	1	58	

Class-breadth: 0.2 magn. and 3'.

$$\sigma_m = 5.15 = 1.03 \text{ magn.} \quad r = -0.57$$

$$\sigma_d = 4.57 = 13'.7 \quad \varepsilon(r) = \pm 0.09$$

II. Correlation between the apparent diameter and the mean magnitude of the brightest *A*-stars.

Apparent magnitude.

Diameter.		6.7	6.9	7.1	7.3	7.5	7.7	7.9	8.1	8.3	8.5	8.7	8.9	9.1	9.3	9.5	9.7	9.9	10.1	10.3	10.5	10.7	10.9	Sum
12—14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1
15—17	—	—	—	—	—	—	—	1	—	—	1	—	1	—	—	—	—	—	1	—	—	—	—	4
18—20	—	—	—	—	—	—	—	1	—	—	—	—	2	—	1	—	—	—	—	—	2	—	—	6
21—23	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	1	1	—	—	—	—	—	—	4
24—26	—	—	—	—	—	—	—	—	—	1	1	—	2	—	—	—	—	—	—	—	—	—	—	4
27—29	—	—	—	—	—	—	—	—	—	—	1	—	1	1	1	—	—	—	—	—	—	—	1	5
30—32	—	—	—	—	—	—	—	—	—	—	1	—	3	—	—	—	—	—	—	—	—	—	—	4
33—35	—	—	—	—	—	—	—	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	2
36—38	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
39—41	—	—	1	—	—	—	—	—	1	1	1	—	—	1	—	—	1	—	—	—	—	—	—	5
42—44	—	—	—	—	—	—	—	—	—	—	1	—	—	1	1	—	—	—	—	—	—	—	—	3
45—47	—	—	—	—	—	—	—	—	1	1	—	—	2	—	—	—	—	—	—	—	—	—	—	4
48—50	—	—	—	—	—	—	—	—	—	—	—	1	2	—	—	—	—	—	—	—	—	—	—	3
51—53	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
54—56	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
57—59	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
60—62	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
63—65	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
66—68	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
69—71	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
Sum		1	1	1	—	—	—	2	4	3	6	3	16	3	3	1	3	—	1	—	2	—	1	51

Class-breadth: 0.2 magn. and 3'.

$$\sigma_m = 3.95 = 0.79 \text{ magn.} \quad \sigma_d = 4.70 = 14'.1 \quad r = -0.49 \quad r(\epsilon) = \pm 0.11$$

III. Correlation between the apparent diameter and the distance.

Distance (in sir.)

Diameter.	Distance (in sir.)																Sum
	$\begin{matrix} r \\ d \end{matrix}$	47.5	62.5	77.5	92.5	107.5	122.5	137.5	152.5	167.5	182.5	197.5	212.5	227.5	242.5	257.5	
15—17	—	—	—	—	—	—	—	1	—	—	—	—	1	—	—	—	2
18—20	—	—	—	—	—	—	—	1	—	1	1	—	1	—	—	—	4
21—23	—	—	—	—	—	—	—	1	2	—	—	—	—	—	—	2	5
24—26	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	2
27—29	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
30—32	—	—	—	—	—	1	—	—	1	—	—	—	—	—	—	—	2
33—35	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
36—38	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1
39—41	—	—	—	—	1	—	—	—	1	—	—	—	—	—	—	—	2
42—44	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
45—47	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	2
48—50	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	2
51—53	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1
54—56	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
57—59	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
60—62	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
63—65	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
66—68	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
69—71	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1
72—74	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
126—128	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Sum		1	—	1	3	5	1	3	4	3	1	—	2	—	—	2	26

Class-breadth: 15 sir. and 3'.

$$\sigma_r = 3.40 = 51 \text{ sir.} \quad \sigma_d = 7.61 = 22'.8. \quad r = -0.69 \quad \epsilon(r) = \pm 0.10$$

D. On the distribution of the stars of different classes outside and inside the clusters.

I will finish this research by giving an account of the distribution of the stars of B-type, A-type, and the other types together. I have got the following figures:

Inside: 54 B-stars; 438 A-stars and 155 of the other types (the stars excluded before are, of course, excluded here too).

Outside: 294 B-stars; 2567 A-stars and 2118 of the other types.

I have computed the following ratios:

$$\frac{B_i}{B_o} = 2.76; \quad \frac{A_i}{A_o} = 2.56 \text{ and } \frac{O_i}{O_o} = 1.10$$

B_i is the sum of the numbers of B-stars, inside the clusters, multiplied by 15 (the surrounding area was 15 times as large as that of the cluster). Index i signifies inside, o outside.

Thus we find that the proportion of the B- and the A-stars is approximately the same (2.5). The number of the other types is the same inside and outside. I have also calculated the ratios $\frac{A_i}{O_i}$ and $\frac{A_o}{O_o}$ and found the former to be 2.88, the latter 1.21. Thus the number of bright A-stars inside the clusters is almost 3 times as large as that of the other classes, outside the numbers are approximately equal.

E. Description of the Tables.

The position of the clusters have also in Tab. II. been referred to a galactic system of coordinates. As such I have used the same as Charlier in the cited memoir. The galactic plane is the one used by Pickering in the researches of the Harvard Observatory.

The coordinates of the pole of this galactic plane are (H. A. 56):

$$\alpha = 12^h 40^m = 190^\circ; \quad \alpha = + 28^\circ.$$

The ascending node of the galactic plane on the celestial equator has $\alpha = 280^\circ$.

We assume the spherical coordinates of a star referred to the galactic system to be ξ , γ and ζ , so that

$$\begin{aligned} \xi &= \cos b. \cos l, \\ \gamma &= \cos b. \sin l, \\ \zeta &= \sin b, \end{aligned}$$

b being the galactic latitude and l the galactic longitude reckoned from the ascending node.

If we now introduce the significations:

$$\begin{aligned} \xi'' &= \cos \delta. \cos (\alpha + 80^\circ) \\ \gamma'' &= \cos \delta. \sin (\alpha + 80^\circ) \\ \zeta'' &= \sin \delta \end{aligned}$$

we get:

$$\begin{aligned}\xi &= \xi'', \\ \gamma &= \gamma'' \sin 28^\circ + \zeta'' \cos 28^\circ, \\ \zeta &= -\gamma'' \cos 28^\circ + \zeta'' \sin 28^\circ.\end{aligned}$$

I have found it suitable to tabulate (in Tab. II) these coordinates of 23 clusters, which are not included in the Tab. I of L. M. II: 19.

In Tab. III the clusters are ordered according to increasing α . Col. 1 gives the number of the cluster. Col. 2 shows the number of the plate. Col. 3 and Col. 4 give the numbers of the cluster in M-e and N. G. C. Col. 5 shows us on which chart of F. A. C. it is to be found. Col. 6 and Col. 7 give the equatorial coordinates from N. G. C. reduced to 1900 as elsewhere, and Col. 8 and 9 the galactic coordinates. Col. 10 contains the galactic square in which the cluster is situated. Col. 11 and Col. 12 give us the dispersion in x and y . Col. 13 and 14 show the diameters in x and y , and Col. 15 gives us the mean value of the two diameters. In Col. 16 is given the distance, expressed in sir., to the cluster when it was possible to determine it. One or two stars after the distance indicates that only B-stars have been used for the calculation [one star: I have used Charlier's value for M_0 (-2.6), two stars: I have used Rasmuson's value (-2.02)]. Col. 17 gives the parallax of the cluster and Col. 18 the mean magnitude of the brightest stars.

* * *

In concluding I wish to express my hearty thanks to Professor C. V. L. Charlier, who has given rise to this work and during its progress has given me much valuable advice. I also take the opportunity of thanking my friends at the Observatory, especially Docent Gunnar Malmquist and Fil. Mag. John Ohlsson, for many valuable suggestions.

Errata.

Page 20, Tab. C, N:o 1	from below	stands 6,	read 8.
» 21,	line 3	» above » 9,	» 11.
» 35,	» 16	» below » GC_7 ,	» GD_8
» 39,	» 17	» above » 111,	» 112.
» 67,	» 3	» below » b^3 ,	» b^2 .
» 68,	» 7	» above » 0.635	» 0.6355
» 68,	» 17	» below » $A 9$	» $A 5$
» 69,	» 3	» above » 13,3,	» 13,5
» 69,	» 18	» below » Shaply,	» Shapley.
» 74,	» 7	» » » m_2 ,	» m_1
» 77,	» 17	» above » 102,8	» 110.8
» 77,	» 18	» » » $101,2 \pm 1,6$	» $105,3 \pm 5,6$
» 78,	» 11	» below » 113,1,	» 120,8
» 78,	» 10	» » » $110,8 \pm 2,3$	» $114,6 \pm 6.1$
» 78,	» 10	» » » $0'',0019$	» $0'',0018$
» 79,	» 5	» » » 7,979	» 7,999
» 79,	» 4	» » » 46,2 and $0'',0045$	» 46,7 and 0,0044

TABLE I.

$$F(x_1) = x_1 + \frac{p(x_1)}{Q(x_1)}.$$

x_1	$p(x_1):Q(x_1)$	$F(x_1)$	x_1	$p(x_1):Q(x_1)$	$F(x_1)$	x_1	$p(x_1):Q(x_1)$	$F(x_1)$
— 4.0	+ 4.221	+ 0.221	— 1.6	+ 2.024	+ 0.424	+ 0.8	+ 0.368	+ 1.168
3.9	4.131	0.231	1.5	1.939	0.439	0.9	0.326	1.226
3.8	4.037	0.237	1.4	1.854	0.454	1.0	0.288	1.288
3.7	3.941	0.241	1.3	1.770	0.470	1.1	0.252	1.352
3.6	3.846	0.246	1.2	1.688	0.488	1.2	0.219	1.419
3.5	3.752	0.252	1.1	1.606	0.506	1.3	0.190	1.490
3.4	3.657	0.257	1.0	1.525	0.525	1.4	0.163	1.563
3.3	3.564	0.264	0.9	1.446	0.546	1.5	0.139	1.639
3.2	3.470	0.270	0.8	1.367	0.567	1.6	0.117	1.717
3.1	3.376	0.276	0.7	1.290	0.590	1.7	0.0984	1.798
3.0	3.283	0.283	0.6	1.215	0.615	1.8	0.0819	1.882
2.9	3.190	0.290	0.5	1.141	0.641	1.9	0.0676	1.968
2.8	3.098	0.298	0.4	1.069	0.669	2.0	0.0553	2.055
2.7	3.006	0.306	0.3	0.998	0.698	2.1	0.0448	2.145
2.6	2.914	0.314	0.2	0.929	0.729	2.2	0.0360	2.236
2.5	2.823	0.323	0.1	0.863	0.763	2.3	0.0286	2.329
2.4	2.732	0.332	0.0	0.798	0.798	2.4	0.0226	2.423
2.3	2.641	0.341	+ 0.1	0.735	0.835	2.5	0.0176	2.518
2.2	2.552	0.352	0.2	0.675	0.875	2.6	0.0136	2.614
2.1	2.462	0.362	0.3	0.617	0.917	2.7	0.0105	2.710
2.0	2.373	0.373	0.4	0.562	0.962	2.8	0.0079	2.808
1.9	2.285	0.385	0.5	0.509	1.009	2.9	0.0060	2.906
1.8	2.197	0.397	0.6	0.459	1.059	3.0	0.0044	3.004
1.7	2.110	0.410	0.7	0.412	1.112			

TABLE II.

	ξ	η	ζ		ξ	η	ζ
M-e 15	— 0.2148	+ 0.9762	+ 0.0259	N. G. C. 2818	— 0.6359	— 0.7546	+ 0.1618
I. C. 361	— 0.4248	+ 0.8998	+ 0.1151	M-e 97	— 0.4153	— 0.9066	— 0.0729
N. G. C. 1817	— 0.8792	+ 0.4307	— 0.2025	» 101	— 0.2170	— 0.9712	— 0.0967
N. G. C. 2243	— 0.8535	— 0.4325	— 0.2905	» 102	— 0.2212	— 0.9715	— 0.0852
N. G. C. 2314	— 0.2517	+ 0.8455	+ 0.4709	» 104	— 0.1719	— 0.9845	— 0.0319
M-e 66	— 0.6653	— 0.7109	— 0.2340	» 105	— 0.1644	— 0.9854	— 0.0441
N. G. C. 2420	— 0.9043	+ 0.2290	+ 0.3604	» 108	— 0.1337	— 0.9855	+ 0.1056
M-e 71	— 0.9528	— 0.2862	+ 0.1016	» 204	+ 0.9419	— 0.3195	— 0.1037
M-e 72	— 0.9565	— 0.2674	+ 0.1165	» 210	+ 0.9954	+ 0.0704	+ 0.0669
N. G. C. 2632	— 0.8236	+ 0.0962	+ 0.5592	N. G. C. 6823	+ 0.8898	+ 0.4557	— 0.0225
M-e 79	— 0.5828	— 0.8106	— 0.0576	M-e 239	+ 0.3789	+ 0.9240	— 0.0517

TABLE III.

N	Plate	M-e	N. G. C.	F. A. C.	α	δ	l	b	Galactic square	σ_x	σ_y
1	—	2	188	206	0 ^h 35. ^m ₁	+ 84° 47'	89°. ^{ss}	+ 22°. ⁷⁷	GC_3	—	—
2	1	6	436	183	1 9. ₄	+ 58 17	91. ⁸⁶	— 3.50	GD_4	—	—
3	1	7	457	183	1 12. ₈	+ 57 48	94. ⁸⁷	— 3.93	GD_4	3'. ₇	3'. ₀
4	1	8	581	183	1 26. ₆	+ 60 11	95. ⁷⁶	— 1.31	GD_4	—	—
5	1	9	654	183	1 37. ₂	+ 61 23	96. ⁷⁹	+ 0.13	GC_4	—	—
6	1	10	659	183	1 37. ₄	+ 60 12	97. ⁰⁸	— 1.02	GD_4	—	—
7	1	11	663	183	1 39. ₂	+ 60 44	97. ¹⁷	— 0.45	GD_4	3.7	3.7
8	2	12	752	165	1 51. ₈	+ 37 11	105. ⁴³	— 22.68	GD_4	10.6	10.7
9	2	13	869	183	2 12. ₀	+ 56 41	102. ⁴¹	— 3.10	GD_4	8.4	8.5
10	2	14	884	183	2 15. ₄	+ 56 39	102. ⁸⁶	— 2.97	GD_4	8.2	10.1
11	3	15	—	183	2 25. ₂	+ 61 0	102. ⁴¹	+ 1.48	GC_4	4.5	4.5
12	1	16	1027	184	2 35. ₀	+ 61 7	103. ⁴⁶	+ 2.13	GC_4	3.8	3.6
13	3	17	1039	166	2 35. ₆	+ 42 21	111. ⁶⁸	— 14.77	GD_4	7.3	8.3
14	1	18	1245	166	3 7. ₈	+ 46 52	114. ⁵²	— 8.04	GD_4	—	—
15	1	21	1342	144	3 25. ₂	+ 36 59	122. ⁹⁷	— 14. ³³	GD_5	4.4	3.9
16	4	23	1528	167	4 7. ₈	+ 50 59	119. ⁷⁰	+ 1.25	GC_4	5.9	6.7
17	—	24	I. C. 361	185	4 10. ₇	+ 58 3	115. ⁰⁶	+ 6.61	GC_4	—	—
18	4	26	1647	121	4 40. ₂	+ 18 53	148. ²⁵	— 15.37	GD_5	10.4	8.8
19	5	27	1664	168	4 43. ₉	+ 43 31	129. ³⁵	+ 0.72	GC_5	4.5	5.6
20	5	28	1746	145	4 57. ₆	+ 23 40	146. ⁸¹	— 9.27	GD_5	9.2	10.4
21	6	29	1807	121	5 4. ₉	+ 16 24	153. ⁸⁶	— 12.06	GD_6	3.9	3.3
22	6	—	1817	121	5 6. ₃	+ 16 34	153. ⁹⁰	— 11.68	GD_6	6.2	5.8
23	2	32	1857	168	5 13. ₂	+ 39 14	136. ⁰⁹	+ 2.52	GC_5	—	—
24	2	33	1893	145	5 19. ₂	+ 33 18	141. ⁵⁴	+ 0.00	GD_5	4.6	4.1
25	6	35	1907	145	5 21. ₄	+ 35 14	140. ³¹	+ 1.62	GC_5	—	—
26	6	36	1912	145	5 22. ₀	+ 35 45	140. ⁰⁰	+ 2.01	GC_5	8.3	7.5
27	3	37	1960	145	5 29. ₅	+ 34 4	142. ²²	+ 2.42	GC_5	4.8	4.1
28	7	38	2099	146	5 45. ₈	+ 32 31	145. ³¹	+ 4.47	GC_5	7.5	6.1
29	3	39	2126	168	5 55. ₂	+ 49 54	130. ⁷¹	+ 14.38	GC_5	—	—
30	—	40	2158	146	6 1. ₃	+ 24 6	154. ³³	+ 3.22	GC_6	—	—
31	7	41	2168	146	6 2. ₇	+ 24 21	154. ²⁶	+ 3.63	GC_6	9.3	8.9
32	—	42	2192	169	6 8. ₂	+ 39 53	140. ⁹⁸	+ 11.96	GC_5	—	—
33	3	43	2194	122	6 8. ₂	+ 12 50	165. ⁶⁹	— 1.26	GD_6	—	—
34	3	44	2204	74	6 11. ₃	— 18 37	193. ⁵⁴	— 14.74	GD_7	3.6	4.0
35	4	45	2215	74	6 16. ₀	— 7 15	183. ⁶⁴	— 8.68	GD_7	—	—
36	—	46	2243	50	6 25. ₇	— 31 13	206. ⁸⁷	— 16.89	GD_7	—	—
37	—	48	2259	123	6 33. ₀	+ 10 58	169. ⁴⁹	+ 3.61	GC_6	—	—
38	4	50	2266	147	6 37. ₀	+ 27 4	156. ³⁷	+ 11.74	GC_6	—	—
39	8	51	2281	169	6 42. ₃	+ 41 10	142. ⁶¹	+ 18.36	GC_5	3.8	4.0
40	8	52	2287	75	6 42. ₇	— 20 38	198. ⁶⁸	— 8.95	GD_7	8.0	7.8
41	4	54	2301	99	6 46. ₆	+ 0 35	180. ²⁶	+ 1.72	GC_7	3.5	3.4
42	—	55	2304	123	6 49. ₂	+ 18 8	164. ⁸⁶	+ 10.35	GC_6	—	—
43	—	56	2309	99	6 51. ₂	— 7 4	187. ⁵⁵	— 0.87	GD_7	—	—
44	—	57	2314	200	6 57. ₁	+ 75 23	106. ⁵⁸	+ 28.09	GC_4	—	—
45	9	58	2323	75	6 58. ₂	— 8 12	189. ³⁷	+ 0.13	GC_7	3.5	4.0
46	4	59	2324	99	6 59. ₀	+ 1 12	181. ¹⁸	+ 4.76	GC_7	2.7	2.5
47	5	60	2335	75	7 1. ₈	— 9 56	191. ³¹	+ 0.10	GC_7	3.8	3.9
48	5	61	2345	75	7 3. ₇	— 13 1	194. ²⁴	— 0.96	GD_7	—	—

Clusters.

	d_z	d_y	Apparent diameter	Distance	Parallax.	$\bar{m}$	Remarks
1	—	—	—				Not distinctly shown
2	—	—	[6']				
3	18'.5—22'.2	14'.8—18'.0	17'—20'	213.6 ± 21.4	0''.00097		M. 103
4	—	—	[7]				
5	—	—	[6]				
6	—	—	[6]				
7	18.3—21.9	18.3—21.9	18—22	206.8 ± 15.3	0.0010		
8	52.9—63.5	53.5—64.2	53—64	113.2 ± 2.5	0.0018	6.0	
9	42.0—50.4	42.5—51.1	42—51	96.7 ± 9.3	0.0021	6.7	
10	41.2—49.4	50.4—60.5	46—55	100.1 ± 1.9	0.0021	7.2	
11	22.7—27.2	22.4—26.9	23—27	135.8 ± 2.0	0.0015	8.1	
12	19.0—22.8	18.0—21.6	18—22	163.6 ± 19.9	0.0013		
13	36.7—44.0	41.4—49.7	39—47	94.3 ± 14.4	0.0022	8.0	M. 34
14	—	—	[7]				
15	22.0—26.4	19.5—23.4	21—25	146.8 ± 4.7	0.0014	8.6	
16	29.4—35.3	33.3—40.0	31—38	145.4 ± 5.0	0.0014	8.8	
17	—	—	—				Not distinctly shown
18	52.0—62.5	44.0—52.7	48—58	94.0 ± 4.5	0.0022	7.0	
19	22.7—27.2	28.0—33.6	25—30	161.4 ± 15.3	0.0013	7.4	
20	46.2—55.4	52.1—62.5	49—59	126.4 ± 11.5	0.0016	8.4	
21	19.4—23.3	16.3—19.6	18—21	265.3 ± 40.1	0.00078	8.8	
22	31.0—37.2	29.0—34.8	30—36	275.8 ± 40.7	0.00075	8.7	
23	—	—	[8]				
24	23.0—27.6	20.6—24.7	22—26	263.0 ± 15.0	0.00078	9.5	
25	—	—	[6]				
26	41.5—49.8	37.5—45.0	40—47	158.2 ± 26.0	0.0013	8.9	M. 38
27	24.1—28.9	20.4—24.5	22—27	154.0 ± 15.0	0.0013		M. 36
28	37.3—44.7	30.5—36.6	34—41	397.9	0.00052		M. 38
29	—	—	[6]				
30	—	—	—				Not distinctly shown
31	46.5—55.8	44.5—53.4	45—55	109.0 ± 4.7	0.0019	8.4	M. 35
32	—	—	—				Not distinctly shown
33	—	—	[6]				
34	17.9—21.5	19.8—23.8	19—23			9.0	
35	—	—	[9]				
36	—	—	—				Not distinctly shown
37	—	—	—				Not shown
38	—	—	[7]				
39	19.2—23.0	20.2—24.2	20—24	134.2 ± 7.3	0.0015	8.9	
40	40.0—48.0	39.2—47.0	40—48	73.9	0.0028	8.1	M. 14
41	17.4—20.8	17.0—20.4	17—21	133.0 ± 15.8	0.0016	8.6	
42	—	—	[4]				
43	—	—	[3]				
44	—	—	—				Not distinctly shown
45	17.5—21.0	20.0—24.0	19—23			7.9	M. 50
46	13.4—16.1	12.3—14.8	13—15			9.6	
47	19.0—22.8	19.5—23.4	19—23			8.0	
48	—	—	[12]			8.9	

N	Plate	M-e	N. G. C.	F. A. C.	α	δ	l	b	Galactic square	σ_z	σ_y
49	6	62	2353	75	7 ^h 9. ^m ₈	— 10° 8'	192°. ₄₄	+ 1°. ₇₃	GC ₇	5.0	5.2
50	6	63	2355	123	7 11. ₃	+ 13 57	171. ₀₉	+ 13. ₂₉	GC ₆	—	—
51	6	64	2360	75	7 13. ₂	— 15 27	197. ₄₉	— 0. ₁₃	GD ₇	3.0	3.6
52	6	65	2362	51	7 14. ₆	— 24 46	205. ₈₁	— 4. ₃₆	GD ₇	—	—
53	7	66	—	31	7 23. ₄	— 47 32	226. ₉₉	— 13. ₅₄	GD ₈	6.9	6.2
54	7	67	2421	76	7 31. ₉	— 20 23	203. ₉₈	+ 1. ₂₈	GC ₇	—	—
55	9	68	2422	76	7 32. ₀	— 14 16	198. ₇₃	+ 4. ₄₀	GC ₇	7.4	6.2
56	7	69	2420	124	7 32. ₅	+ 21 48	165. ₇₉	+ 21. ₁₂	GC ₆	—	—
57	9	70	2423	76	7 32. ₅	— 13 38	198. ₂₂	+ 4. ₈₃	GC ₇	5.4	5.5
58	7	71	—	76	7 32. ₉	— 11 50	196. ₇₂	+ 5. ₈₃	GC ₇	2.5	2.9
59	—	72	—	76	7 33. ₇	— 10 27	195. ₆₂	+ 6. ₆₉	GC ₇	—	—
60	—	73	2432	76	7 36. ₅	— 18 51	203. ₂₂	+ 2. ₉₉	GC ₇	—	—
61	7	74	2439	52	7 37. ₀	— 31 25	214. ₀₅	— 3. ₄₀	GD ₈	—	—
62	9	75	2437	76	7 37. ₂	— 14 35	199. ₆₃	+ 5. ₃₂	GC ₇	5.9	6.0
63	10	76	2447	52	7 40. ₄	— 23 38	207. ₇₈	+ 1. ₃₀	GC ₇	6.0	5.5
64	—	77	2455	76	7 44. ₆	— 21 3	206. ₀₅	+ 3. ₅₀	GC ₇	—	—
65	10	78	2477	32	7 48. ₇	— 38 17	221. ₁₇	— 4. ₉₄	GD ₈	5.7	5.5
66	8	79	2489	52	7 52. ₂	— 29 48	214. ₄₁	+ 0. ₂₄	GC ₈	—	—
67	8	80	2506	76	7 55. ₂	— 10 21	197. ₇₆	+ 11. ₂₇	GC ₇	2.7	3.3
68	—	81	2509	76	7 56. ₃	— 18 48	205. ₆₆	+ 7. ₀₀	GC ₇	—	—
69	26	82	2516	16	7 56. ₇	— 60 36	241. ₂₄	— 15. ₄₆	GD ₉	18.5	18.8
70	11	83	2539	76	8 6. ₀	— 12 32	201. ₆₀	+ 12. ₃₆	GC ₇	5.5	5.3
71	11	84	2547	32	8 7. ₇	— 48 58	232. ₀₇	— 7. ₉₂	GD ₈	4.6	4.3
72	12	85	2548	100	8 8. ₈	— 5 30	195. ₈₂	+ 16. ₆₉	GC ₇	9.6	10.1
73	8	86	2567	52	8 14. ₆	— 30 20	217. ₅₉	+ 3. ₉₄	GC ₈	—	—
74	8	87	2627	53	8 33. ₁	— 29 36	219. ₄₂	+ 7. ₅₇	GC ₈	—	—
75	12	88	2632	125	8 34. ₃	+ 20 20	173. ₃₄	+ 34. ₀₀	GB ₅	23.7	27.7
76	—	89	2635	53	8 34. ₅	— 34 25	223. ₃₈	+ 4. ₈₀	GC ₈	—	—
77	9	90	2658	53	8 39. ₄	— 32 18	222. ₄₀	+ 6. ₉₃	GC ₈	—	—
78	9	91	2659	33	8 39. ₂	— 44 36	231. ₈₄	— 0. ₉₉	GD ₈	—	—
79	13	—	—	33	8 38. ₀	— 47 58	234. ₂₉	— 3. ₃₀	GD ₈	5.2	4.8
80	13	93	2670	33	8 42. ₄	— 48 25	235. ₁₀	— 3. ₀₄	GD ₈	—	—
81	13	94	2682	125	8 45. ₈	+ 12 11	183. ₆₅	+ 33. ₃₃	GB ₆	5.1	4.9
82	—	96	2818	53	9 12. ₀	— 36 12	229. ₈₈	+ 9. ₂₈	GC ₈	—	—
83	10	97	—	17	9 24. ₁	— 56 36	245. ₃₉	— 4. ₁₈	GD ₉	8.6	6.9
84	14	98	3114	17	9 59. ₅	— 59 38	250. ₉₄	— 3. ₆₅	GD ₉	8.7	9.2
85	—	100	3293	18	10 32. ₀	— 57 43	253. ₂₅	+ 0. ₀₆	GC ₉	—	—
86	14	101	—	18	10 38. ₆	— 64 34	257. ₄₀	— 5. ₅₅	GD ₉	5.4	6.7
87	14	102	—	18	10 39. ₄	— 63 52	257. ₁₇	— 4. ₈₈	GD ₉	13.9	13.9
88	15	103	3532	18	11 2. ₂	— 58 8	257. ₃₇	+ 1. ₄₇	GC ₉	10.1	13.9
89	10	104	—	18	11 13. ₆	— 62 10	260. ₁₀	— 1. ₈₃	GD ₉	2.9	3.2
90	—	105	—	18	11 15. ₂	— 62 58	260. ₅₃	— 2. ₅₃	GD ₉	—	—
91	10	106	3680	34	11 20. ₉	— 42 41	254. ₉₁	+ 17. ₀₁	GC ₉	—	—
92	10	107	3766	18	11 31. ₅	— 61 3	261. ₈₁	— 0. ₁₄	GD ₉	—	—
93	11	108	—	18	11 45. ₉	— 55 8	262. ₂₈	+ 6. ₀₆	GC ₉	—	—
94	11	109	4103	19	12 1. ₅	— 60 41	265. ₃₀	+ 0. ₉₇	GC ₉	—	—
95	15	110	4349	19	12 19. ₀	— 61 20	267. ₄₈	+ 0. ₅₇	GC ₉	5.8	4.7
96	11	114	4755	19	12 47. ₇	— 59 48	270. ₈₃	+ 2. ₁₉	GC ₁₀	—	—
97	11	116	4852	19	12 54. ₁	— 59 4	271. ₈₁	+ 2. ₈₈	GC ₁₀	—	—
98	—	120	5281	20	13 39. ₇	— 62 24	276. ₈₅	— 1. ₂₀	GD ₁₀	—	—
99	12	122	5316	20	13 46. ₉	— 61 22	277. ₉₃	— 0. ₄₀	GD ₁₀	5.8	5.5
100	16	123	5460	36	14 1. ₂	— 47 50	283. ₇₇	+ 12. ₀₀	GC ₁₀	8.8	8.7

	d_x	d_y	Apparent diameter	Distance	Parallax.	$\bar{m}$	Remarks
49	25'.0—30'.0	26'.0—31'.2	26'—31'	69.0 **	0''.0030	8.2	
50	—	—	[10]				
51	15.1—18.4	18.0—21.6	17—20	139.3 **	0.0015	8.7	
52	—	—	[7]				
53	34.7—41.7	30.8—37.0	33—39			7.8	
54	—	—	[10]				
55	37.0—44.7	31.1—37.3	34—41	62.8	0.0033	6.6	
56	—	—	[6]				
57	27.0—32.4	27.5—33.0	27—33			9.1	
58	12.7—15.2	14.6—17.5	13—16				
59	—	—	[5]				
60	—	—	—				Not shown
61	—	—	[9]				
62	29.4—35.3	30.2—36.2	30—36			8.9	M. 46
63	30.0—36.0	27.5—33.0	29—35			8.9	M. 93
64	—	—	—				Not distinctly shown
65	28.5—34.2	27.5—33.0	28—34				
66	—	—	[7]				
67	13.4—16.1	16.6—19.9	15—18				
68	—	—	[5]				
69	92.4—110.9	93.8—112.6	93—112	58.8	0.0035	6.2	
70	27.7—33.2	26.6—31.9	27—33			9.2	
71	23.0—27.5	21.3—25.5	22—27	71.8 *	0.0029	8.6	
72	48.2—57.8	50.4—60.5	49—59	135.3	0.0015	9.0	
73	—	—	[12]				
74	—	—	[12]			8.8	
75	118.7—142.5	138.3—166.0	2 ⁰⁸ '—2 ⁰³ 4'	41.9 ± 4.9	0.0049	6.8	M. 44 Præsepe
76	—	—	—				Not distinctly shown
77	—	—	[9]			10.8	
78	—	—	[12]			7.3	
79	26.0—31.2	24.0—28.8	25—30			7.6	
80	—	—	[12]			7.8	
81	25.5—30.6	24.5—29.4	25—30	173.7 ± 22.6	0.0012	7.8	M. 67
82	—	—	—				Not distinctly shown
83	43.1—51.7	34.4—41.3	39—47			8.1	
84	43.5—52.4	46.0—55.2	45—54	116.4	0.0018	8.8	
85	—	—	[10]				
86	27.0—32.4	33.3—40.0	30—36				
87	69.7—83.7	69.7—83.7	70—84	33.2	0.0062	5.1	
88	50.5—60.6	69.5—83.4	60—72	97.5 ± 5.8	0.0021	6.1	
89	14.5—17.4	16.0—19.2	15—18				
90	—	—	[4]				
91	—	—	[12]				
92	—	—	[12]			8.8	
93	—	—	[8]				
94	—	—	[9]			8.9	
95	28.8—34.6	23.5—28.2	26—31			8.4	
96	—	—	[12]				
97	—	—	[12]				
98	—	—	—				Not shown
99	29.1—34.9	27.4—32.9	28—34			8.7	
100	44.2—53.1	43.4—52.1	44—53			9.2	

N	Plate	M-e	N. G. C.	F. A. C.	α	δ	l	b	Galactic square	σ_z	σ_y
101	16	125	5617	20	14 ^h 22. ^m ₃	— 60° 16'	282°. ^s ₃₆	— 0°. ^s ₇₃	GD ₁₀	4.3	4.9
102	12	127	5662	20	14 28.0	— 56 7	284. ^s ₆₈	+ 2.80	GC ₁₀	5.6	5.6
103	13	128	5715	20	14 36.1	— 57 7	285. ^s ₂₉	+ 1.42	GC ₁₀	—	—
104	17	130	5822	20	14 57.9	— 53 57	289. ^s ₄₈	+ 2.80	GC ₁₀	8.8	9.2
105	13	131	5823	20	14 58.3	— 55 12	288. ^s ₉₁	+ 1.68	GC ₁₀	3.8	3.9
106	13	137	5999	21	15 44.3	— 56 10	293. ^s ₆₇	— 2.81	GD ₁₀	—	—
107	13	138	6005	21	15 47.8	— 57 8	293. ^s ₄₂	— 3.85	GD ₁₀	—	—
108	14	139	6025	21	15 55.2	— 60 13	292. ^s ₁₁	— 6.81	GD ₁₀	3.1	3.8
109	17	140	6067	21	16 5.4	— 53 57	297. ^s ₄₀	— 3.15	GD ₁₀	—	—
110	18	141	6087	21	16 10.6	— 57 39	295. ^s ₃₄	— 6.32	GD ₁₀	2.9	3.1
111	18	145	6124	38	16 18.8	— 40 26	308. ^s ₅₇	+ 4.81	GC ₁₁	6.4	6.6
112	14	146	6134	38	16 20.3	— 48 55	302. ^s ₆₁	— 1.25	GD ₁₁	—	—
113	15	149	6192	38	16 33.3	— 43 10	308. ^s ₃₇	+ 0.97	GC ₁₁	3.8	2.5
114	—	152	6222	39	16 43.5	— 44 33	308. ^s ₅₇	— 1.34	GD ₁₁	—	—
115	15	155	6242	39	16 48.8	— 39 20	313. ^s ₁₈	+ 1.20	GC ₁₁	4.4	5.8
116	—	156	6253	39	16 51.2	— 52 33	303. ^s ₀₄	— 7.31	GD ₁₁	—	—
117	19	158	6259	39	16 53.5	— 44 31	309. ^s ₆₄	— 2.69	GD ₁₁	4.8	5.0
118	19	161	6281	39	16 58.0	— 37 45	315. ^s ₅₆	+ 0.76	GC ₁₁	4.3	4.0
119	—	166	6318	39	17 10.8	— 39 20	315. ^s ₇₄	— 2.20	GD ₁₁	—	—
120	20	169	I. C. 4651	39	17 16.9	— 49 50	307. ^s ₆₄	— 9.01	GD ₁₁	4.6	3.9
121	16	177	6400	39	17 32.7	— 36 53	320. ^s ₁₈	— 4.45	GD ₁₁	—	—
122	20	178	6405	62	17 33.5	— 32 9	324. ^s ₂₇	— 2.05	GD ₁₁	7.8	8.5
123	16	181	6451	62	17 44.3	— 30 11	327. ^s ₁₅	— 2.98	GD ₁₁	—	—
124	16	182	6469	62	17 46.9	— 22 19	334. ^s ₂₁	+ 0.53	GC ₁₂	5.0	4.0
125	21	183	6475	62	17 47.3	— 34 47	323. ^s ₅₁	— 5.88	GD ₁₁	23.0	25.0
126	21	184	6494	86	17 51.0	— 19 0	337. ^s ₅₅	+ 1.39	GC ₁₂	8.8	8.3
127	—	187	6520	62	17 57.1	— 27 54	330. ^s ₅₄	— 4.27	GD ₁₂	—	—
128	22	188	6531	62	17 58.6	— 22 30	335. ^s ₄₂	— 1.90	GD ₁₂	3.5	4.0
129	—	197	6603	86	18 12.6	— 18 27	340. ^s ₅₅	— 2.79	GD ₁₂	—	—
130	22	201	6633	110	18 22.7	+ 6 30	3.76	+ 6.84	GC ₁	5.6	6.6
131	23	204	—	86	18 25.8	— 19 19	341. ^s ₂₆	— 5.95	GD ₁₂	12.0	10.8
132	23	205	6645	86	18 26.8	— 16 58	343. ^s ₄₆	— 5.07	GD ₁₂	3.0	3.4
133	16	206	6649	86	18 27.9	— 10 28	349. ^s ₃₆	— 2.29	GD ₁₂	—	—
134	17	209	6664	87	18 31.3	— 8 18	351. ^s ₄₂	— 1.55	GD ₁₂	3.8	4.2
135	24	210	—	111	18 34.0	+ 5 22	4.04	+ 3.84	GD ₁	13.5	14.5
136	17	212	6694	87	18 39.8	— 9 30	351. ^s ₅₈	— 4.40	GD ₁₂	2.7	2.7
137	24	214	6709	135	18 46.8	+ 10 14	9. ^s ₈₈	+ 3.30	GC ₁	4.6	3.3
138	17	222	6811	179	19 35.2	+ 46 20	46. ^s ₈₈	+ 11.20	GC ₂	3.6	3.9
139	—	223	6819	179	19 37.9	+ 39 57	41. ^s ₅₁	+ 7.60	GC ₂	—	—
140	17	—	6823	160	19 38.9	+ 23 37	27. ^s ₁₂	— 1.29	GD ₁	—	—
141	—	224	6830	160	19 46.8	+ 22 50	27. ^s ₈₈	— 2.96	GD ₁	2.9	3.1
142	18	225	6834	160	19 48.2	+ 29 9	33. ^s ₃₈	+ 0.15	GC ₂	—	—
143	18	229	6866	179	20 0.5	+ 43 43	46. ^s ₉₇	+ 6.03	GC ₂	4.3	4.5
144	—	231	6939	195	20 29.4	+ 60 18	63. ^s ₂₇	+ 11.88	GC ₃	—	—
145	24	232	6940	161	20 30.4	+ 27 58	37. ^s ₇₆	— 8.11	GD ₂	5.4	5.5
146	25	238	7209	181	22 1.2	+ 46 0	63. ^s ₄₁	— 7.72	GD ₃	7.3	7.2
147	—	239	—	196	22 6.7	+ 52 20	67. ^s ₇₀	— 2.96	GD ₃	—	—
148	25	240	7243	181	22 11.3	+ 49 23	66. ^s ₆₉	— 5.82	GD ₃	3.6	5.2
149	—	241	7245	196	22 11.5	+ 53 50	69. ^s ₁₂	— 2.09	GD ₃	—	—
150	18	243	7654	196	23 19.8	+ 61 3	80. ^s ₄₅	+ 0.53	GC ₃	3.7	3.2
151	—	244	7762	182	23 45.0	+ 67 28	84. ^s ₇₄	+ 6.05	GC ₃	—	—
152	18	245	7789	182	23 52.0	+ 56 10	83. ^s ₃₃	— 5.22	GD ₃	9.6	8.8

	d_x	d_y	Apparent diameter	Distance	Parallax.	$\overline{m}$	Remarks
101	21'.3—25'.5	24'.4—29'.4	23'—27'	133.0 **	0''.0016	8.9	
102	28.0—33.6	28.0—33.6	28—34			7.5	
103	—	—	[12']			9.9	
104	44.0—52.8	46.0—55.2	45—54			8.6	
105	18.8—22.5	19.2—22.4	19—22			9.0	
106	—	—	[10]	82.0 *	0.0025	8.8	
107	—	—	[4]				
108	15.7—18.8	19.0—22.8	17—21			7.0	
109	—	—	[15]			9.7	
110	14.5—17.4	15.5—18.6	15—18			8.9	
111	32.0—38.4	33.0—39.6	33—39	145.9 **	0.0014	9.0	Not distinctly shown
112	—	—	[10]				
113	18.8—22.5	12.6—15.1	16—19			10.1	
114	—	—	—				
115	21.8—26.2	29.1—34.9	25—31				
116	—	—	[6]				
117	23.8—28.6	24.9—29.9	24—29			9.2	
118	21.6—25.9	19.9—23.9	21—25				
119	—	—	—				
120	23.0—27.6	19.6—23.5	21—26				
121	—	—	[7]	56.4	0.0037		M. 6
122	39.2—47.0	42.3—50.9	41—49			7.0	
123	—	—	[5]				
124	25.2—30.2	19.9—23.9	22—27			9.8	
125	115.0—138.0	125.0—150.0	120—144	46.7	0.0044	6.2	
126	44.0—52.8	41.4—49.7	43—51	83.7	0.0025	9.2	
127	—	—	[6]	145.9 **	0.0014	8.6	
128	17.4—20.8	19.9—23.9	19—22			7.8	
129	—	—	[5]				
130	28.0—33.6	33.0—39.6	31—37			8.6	
131	59.9—71.9	53.8—64.5	57—68	105.3 ± 5.6	0.0020	7.2	
132	15.1—18.1	16.8—20.2	16—19				M. 26
133	—	—	[8]				
134	19.0—22.8	21.0—25.2	20—24				
135	67.5—81.0	72.5—87.0	70—84	77.6 ± 4.8	0.0027	6.5	
136	13.4—16.1	13.7—16.5	14—16	176.2 ± 17.9	0.0012		
137	23.0—27.6	16.5—19.8	20—24			9.3	
138	18.2—21.8	19.3—23.2	19—23				
139	—	—	[6]				
140	—	—	[6]				
141	14.5—17.4	15.5—18.6	15—18	255.8 ± 28.0	0.00081		Not distinctly shown
142	—	—	[10]				
143	21.3—25.5	22.7—27.2	22—26				
144	—	—	—				
145	27.2—32.6	27.7—33.3	27—33				
146	36.4—43.7	35.8—43.0	36—43	114.6 ± 6.1	0.0018		
147	—	—	[6]				
148	17.9—21.5	26.0—31.2	22—26				
149	—	—	—				
150	18.5—22.2	16.0—19.2	17—21				
151	—	—	—				Not distinctly shown
152	47.9—57.5	44.2—53.1	46—55				
							M. 12
							Not shown

The plates are enlargements of F. A. C. made on the scale 3.8 to 1 by Kemi-grafiska Aktiebolaget, Malmö, Sweden. On these plates 1 mm. corresponds to 1',₀₃. The number in N. G. C. is given and α and δ are denoted accordingly to Pickering's well-known notation. In Tab. IV I have given the deviation (v) of the direction for increasing δ from the positive y -direction (upwards) and denoted this deviation, if to the left as positive and to the right as negative. The direction of increasing α is to the left, with the same deviation as that of δ .

TABLE IV.

N. G. C.	v.	N. G. C.	v.	N. G. C.	v.	N. G. C.	v.	N. G. C.	v.	N. G. C.	v.
436	+ 4.2	1907	— 0.9	M-e 66	— 3.0	79	— 7.3	5715	+ 2.5	6494	— 0.8
457	+ 3.6	1912	— 1.0	2421	— 1.9	2670	— 6.5	5822	+ 7.2	6531	0.0
581	+ 1.0	1960	— 1.8	2422	— 1.9	2682	+ 1.2	5823	+ 7.2	6633	0.0
654	— 1.6	2099	+ 1.8	2420	+ 1.5	M-e 97	— 1.7	5999	— 2.8	M-e 204	+ 1.5
659	— 1.6	2126	— 6.3	2423	— 1.9	3114	+ 5.0	6005	— 1.6	6645	+ 1.5
663	— 2.0	2168	+ 0.1	2439	— 2.4	M-e 101	— 7.2	6025	+ 0.1	6649	+ 1.6
752	— 5.5	2194	— 0.2	2437	— 1.6	M-e 102	— 7.0	6067	+ 2.3	6664	— 2.0
869	— 9.1	2204	+ 0.9	2447	— 2.0	3532	— 2.1	6087	+ 3.4	M-e 210	0.0
884	— 9.7	2215	+ 1.2	2477	— 1.8	M-e 104	— 1.0	6124	+ 3.3	6694	— 1.5
M-e 15	— 11.5	2266	+ 2.5	2489	— 0.7	3680	+ 7.1	6134	+ 3.6	6709	+ 1.0
1027	+ 8.0	2281	+ 0.2	2506	0.0	3766	+ 4.1	6192	+ 5.8	6811	+ 4.5
1039	+ 0.7	2287	— 1.2	2516	— 0.7	M-e 108	+ 7.3	6242	— 5.5	6823	+ 2.0
1245	— 4.1	2301	0.0	2539	+ 0.4	4103	— 10.1	6259	— 4.9	6830	+ 1.1
1342	+ 3.3	2323	0.0	2547	+ 1.6	4349	— 6.2	6281	— 4.2	6834	+ 0.9
1528	— 0.8	2324	0.0	2548	0.0	4755	— 0.2	I.c. 4651	— 0.8	6866	0.0
1647	+ 1.1	2335	0.0	2567	+ 1.8	4852	+ 1.5	6400	+ 2.1	6940	+ 3.0
1664	+ 6.6	2345	+ 0.2	2627	— 3.0	5316	— 8.3	6405	— 2.9	7209	+ 7.0
1746	+ 0.8	2353	+ 0.6	2632	+ 1.9	5460	+ 7.4	6451	— 1.7	7243	+ 5.2
1817	— 0.6	2355	— 0.4	2658	— 2.3	5617	— 0.8	6469	— 1.4	7654	— 11.4
1857	+ 1.1	2360	+ 0.9	2659	— 7.1	5662	+ 0.5	6475	— 1.4	7789	+ 1.6
1893	— 0.6	2362	+ 1.9								



Errata in the numbers of the Plates.

Plate 13 stands 80 read 79.
„ 17 „ 6830 „ 6823.

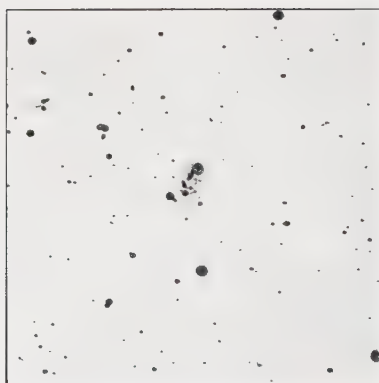
PLATES

PLATE 1.

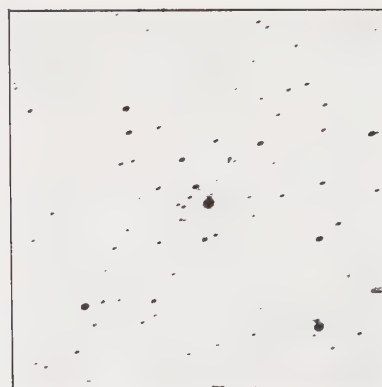


N. G. C. 457.
(011257)

N. G. C. 436.
(010958)

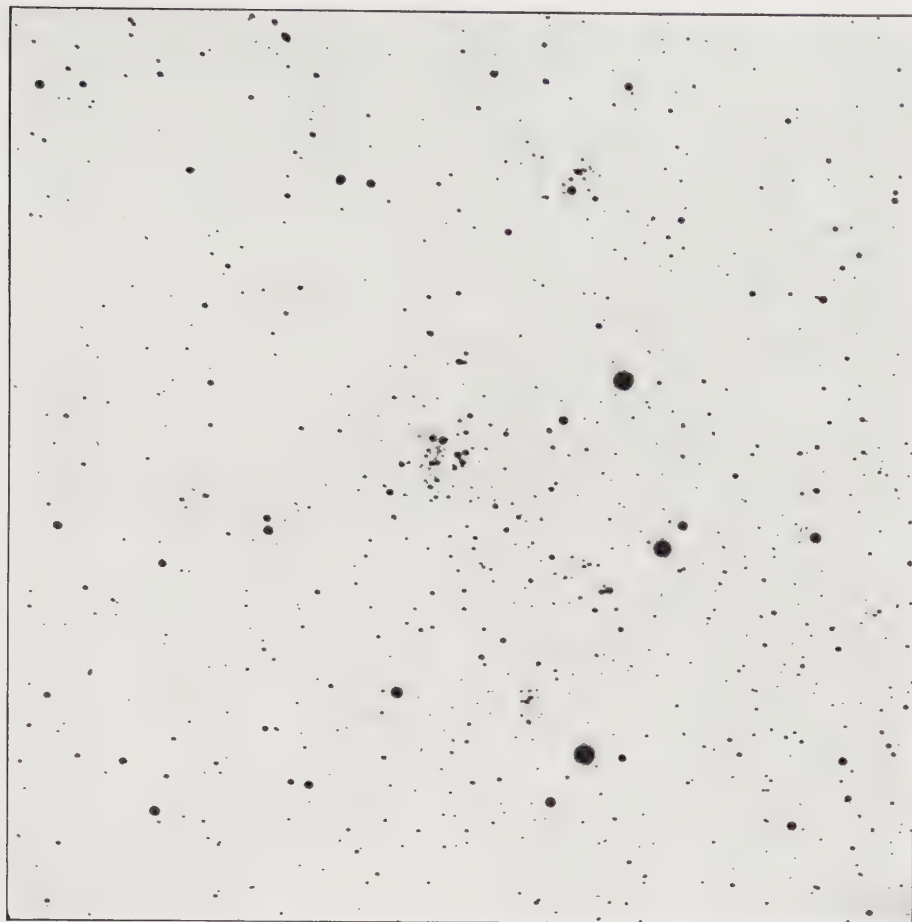


N. G. C. 581.
(012660)



N. G. C. 1027.
(023561)

PLATE 1.



N. G. C. 663.
(013960)

N. G. C. 659.
(013760)

N. G. C. 654.
(013761)



N. G. C. 1245.
(030746)

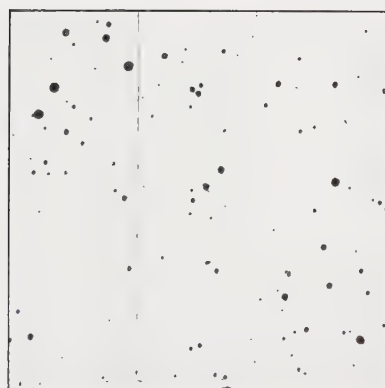


N. G. C. 1342.
(032536)

PLATE 2.



N. G. C. 752.
(015137)



N. G. C. 1857.
(051339)



N. G. C. 1893.
(051933)



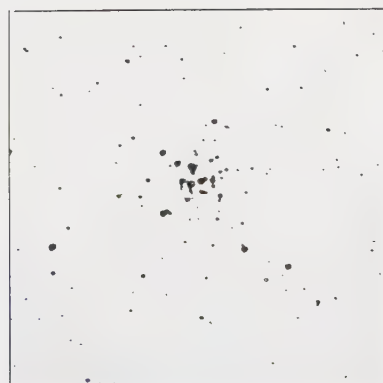
N. G. C. 884.
(021556)

N. G. C. 869.
(021256)

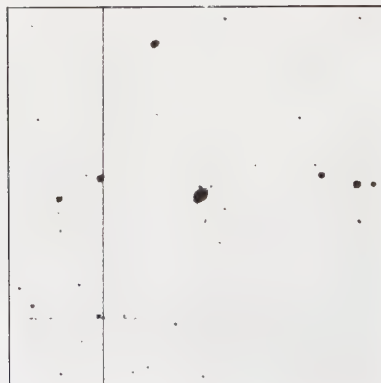
PLATE 3.



M-e 15.
(022561)

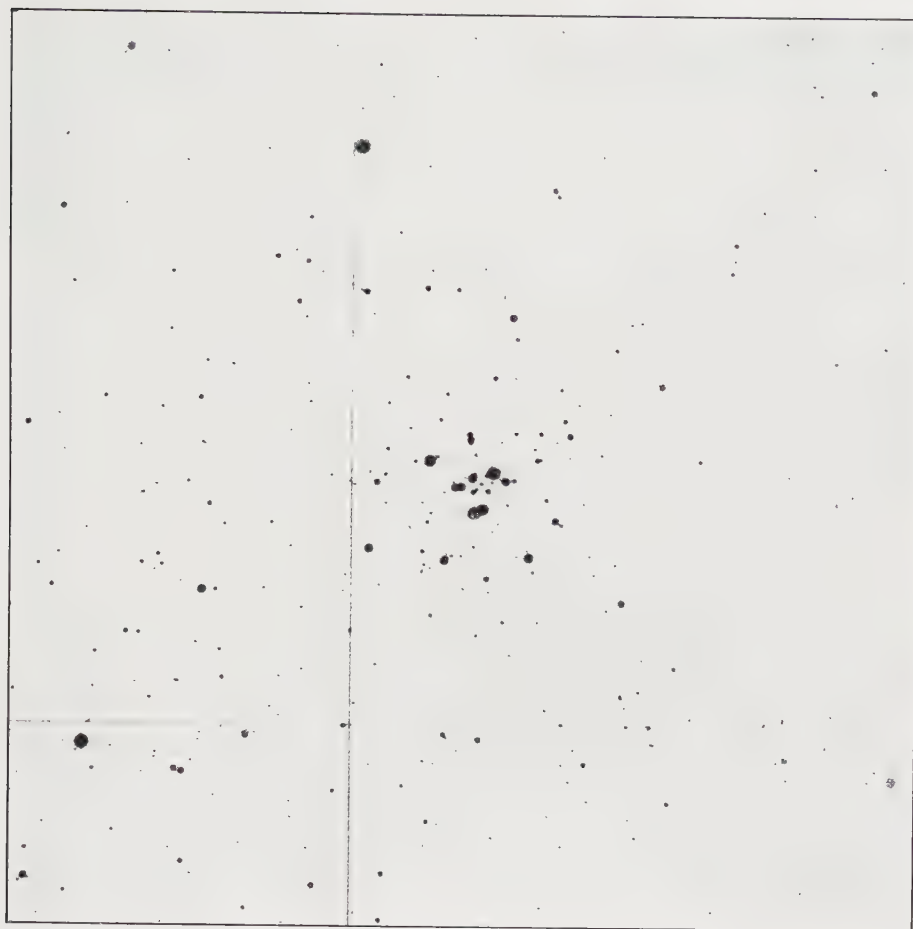


N. G. C. 1960.
(052934)

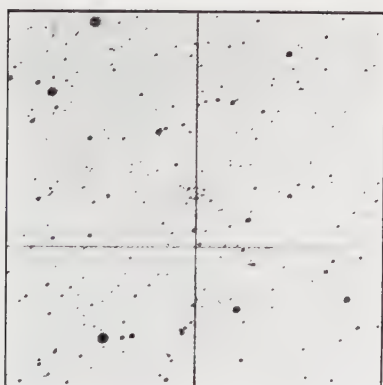


N. G. C. 2126.
(055549)

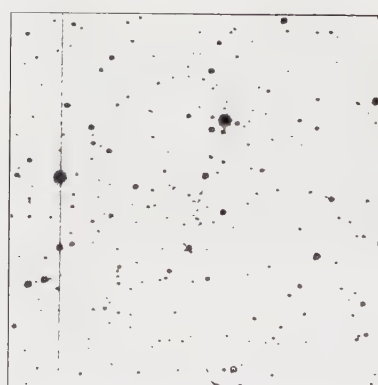
PLATE 3.



N. G. C. 1039.
(023542)

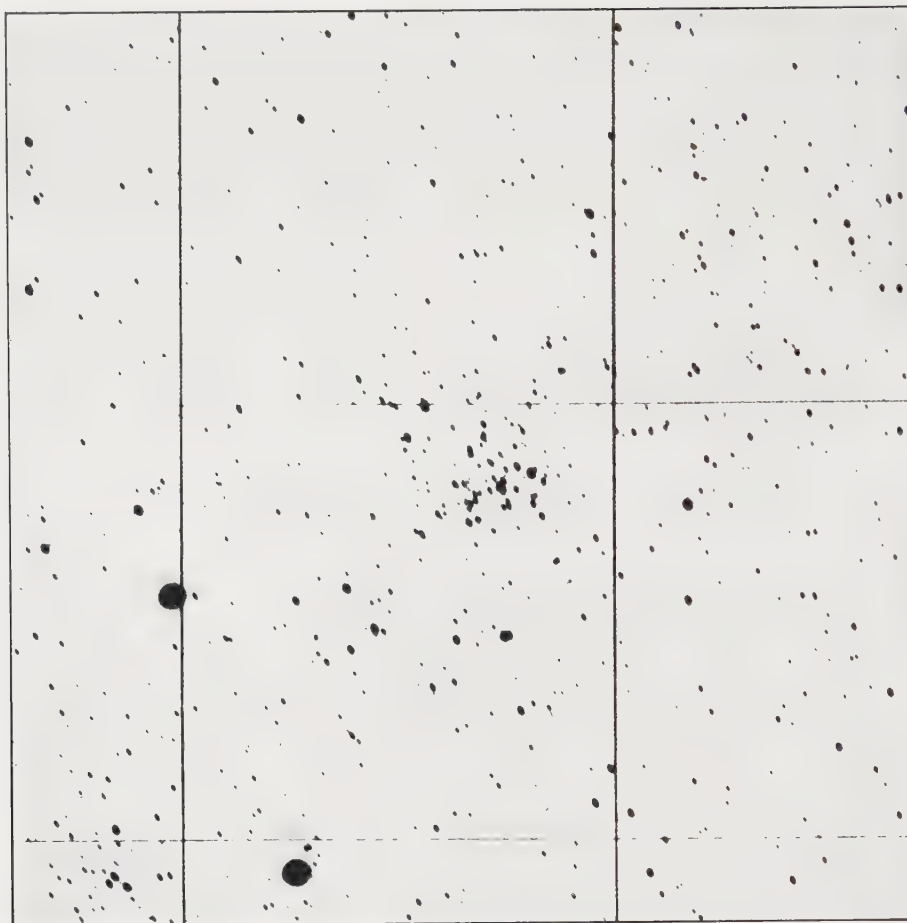


N. G. C. 2194.
(060812)

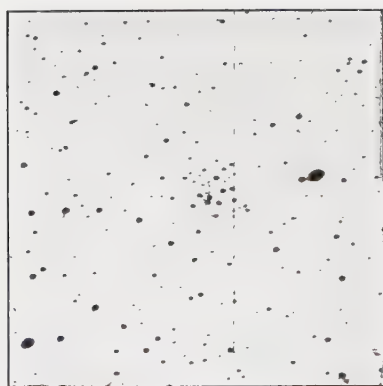


N. G. C. 2204.
(061118)

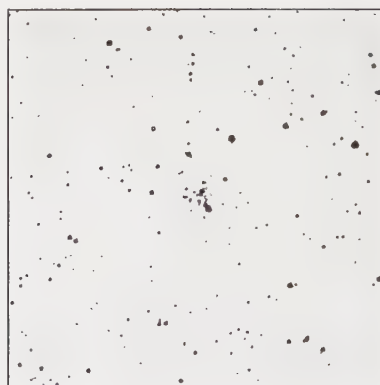
PLATE 4.



N. G. C. 1528.
(040750)



N. G. C. 2215.
(061607)

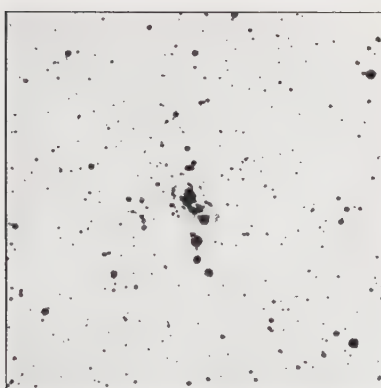


N. G. C. 2266.
(063727)

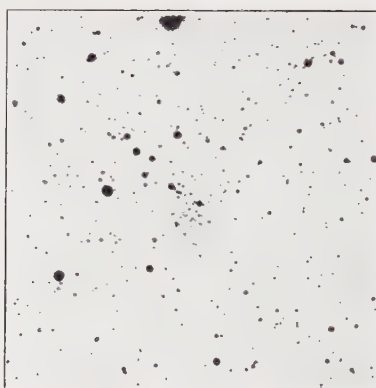
PLATE 4.



N. G. C. 1647.
(044018)



N. G. C. 2301.
(064600)

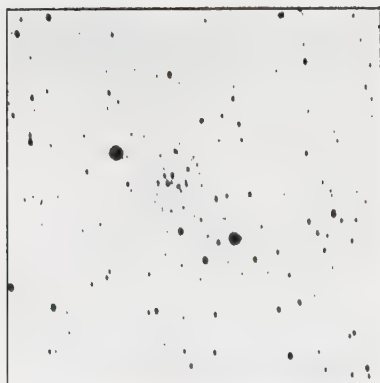


N. G. C. 2324.
(065901)

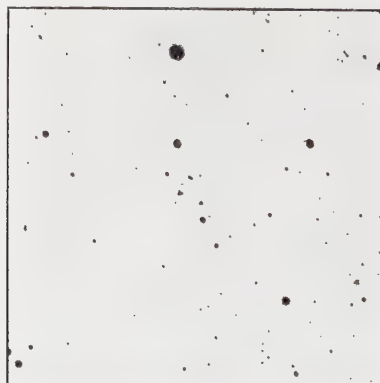
PLATE 5.



N. G. C. 1664.
(044343)



N. G. C. 2335.
(070109)



N. G. C. 2345.
(070313)



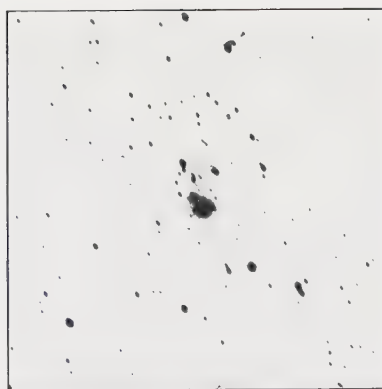
N. G. C. 1746.
(045723)

PLATE 6.

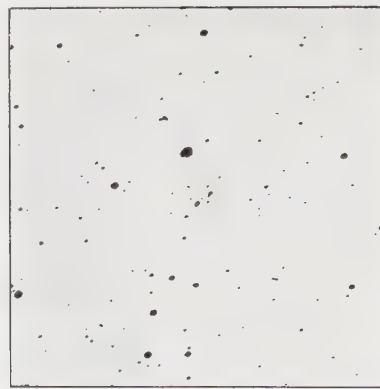


N. G. C. 1817.
(050616)

N. G. C. 1807.
(050416)



N. G. C. 2353.
(070910)



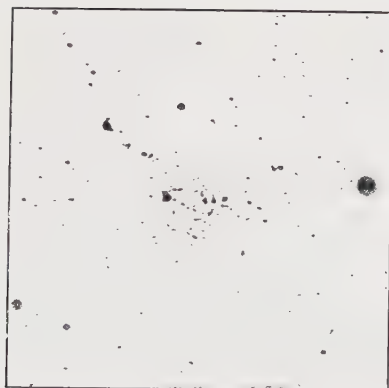
N. G. C. 2355.
(071113)

PLATE 6.

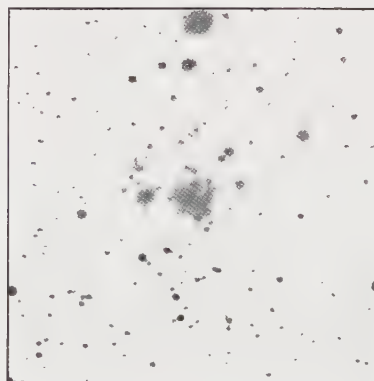


N. G. C. 1912.
(052235)

N. G. C. 1907.
(052135)

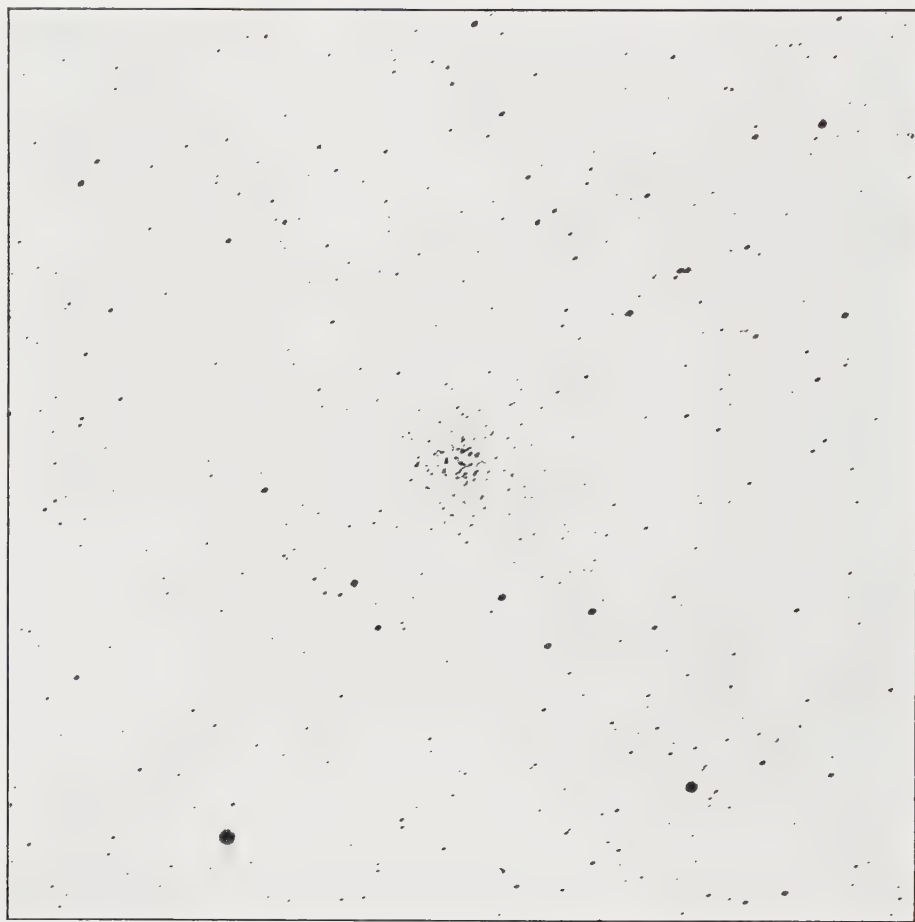


N. G. C. 2360.
(071315)

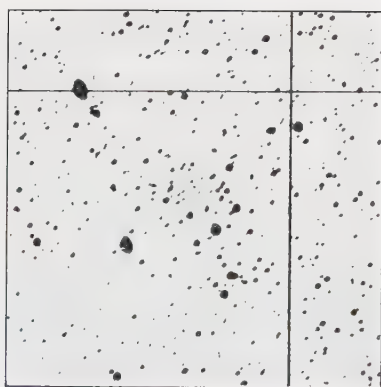


N. G. C. 2362.
(071424)

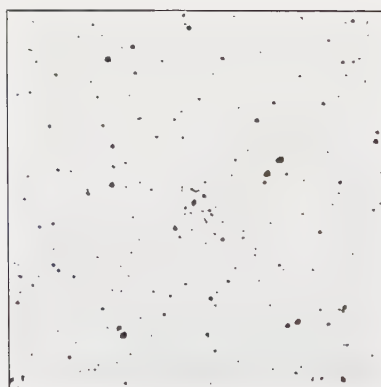
PLATE 7.



N. G. C. 2099.
(054532)



M-e 66.
(072347)



N. G. C. 2421.
(073120)

PLATE 7.



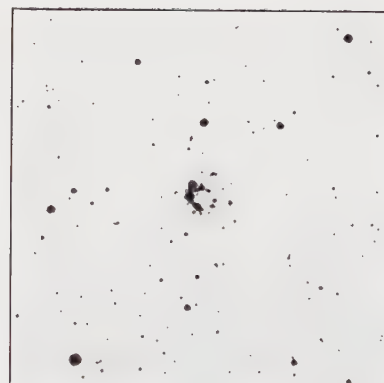
N. G. C. 2168.
(060224)



N. G. C. 2420.
(073221)



M-e 71.
(073211)

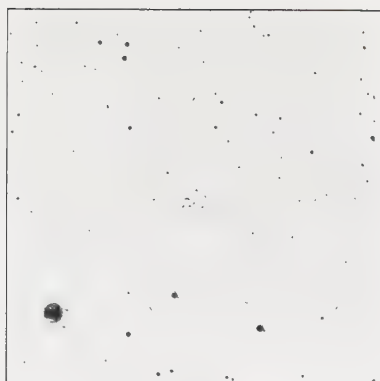


N. G. C. 2439.
(073731)

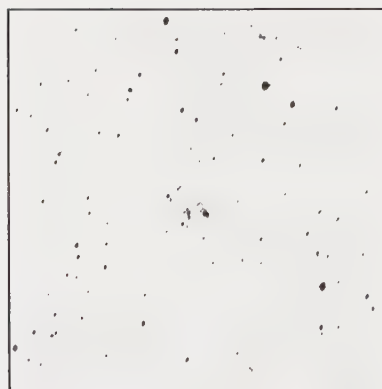
PLATE 8.



N. G. C. 2281.
(064241)



N. G. C. 2489.
(075229)

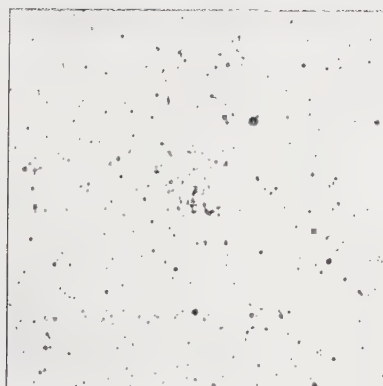


N. G. C. 2506.
(075510)

PLATE 8.



N. G. C. 2287.
(064220)



N. G. C. 2567.
(081430)

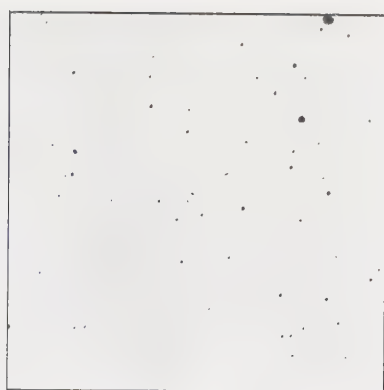


N. G. C. 2627.
(083329)

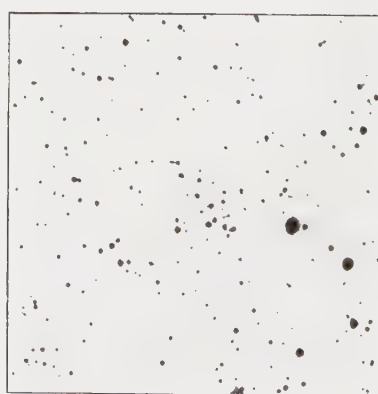
PLATE 9.



N. G. C. 2323.
(065808)



N. G. C. 2658.
(083932)



N. G. C. 2659.
(083944)



N. G. C. 2437.
(073714)

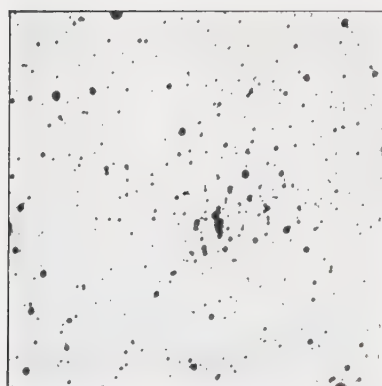
N. G. C. 2423.
(073213)

N. G. C. 2422.
(073214)

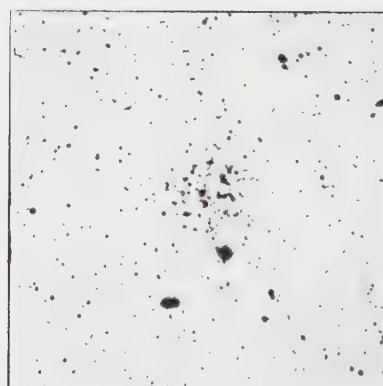
PLATE 10.



N. G. C. 2447.
(074023)



M-e 97.
(092456)

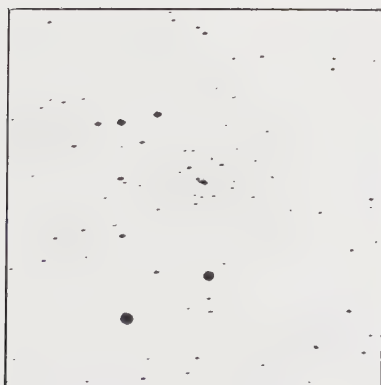


M-e 104.
(111362)

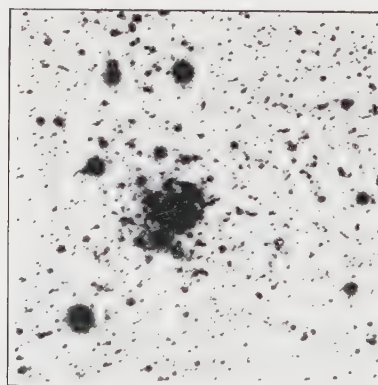
PLATE 10.



N. G. C. 2477.
(074838)



N. G. C. 3680.
(112042)

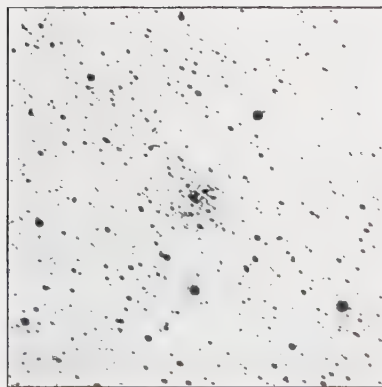


N. G. C. 3766.
(113161)

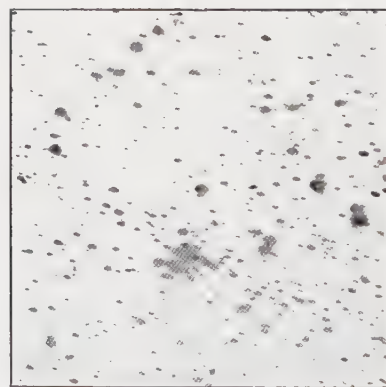
PLATE 11.



N. G. C. 2539.
(080612)



M-e 108.
(114555)

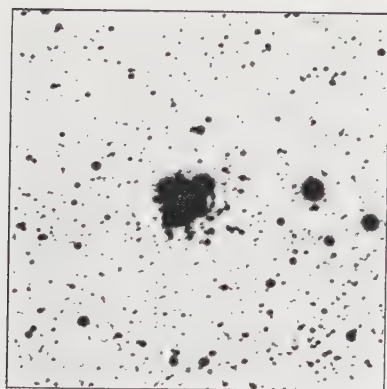


N. G. C. 4103.
(120160)

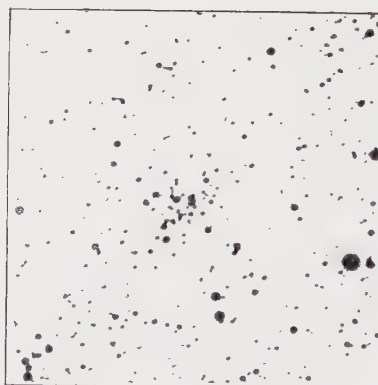
PLATE 11.



N. G. C. 2547.
(080748)



N. G. C. 4755.
(124759)

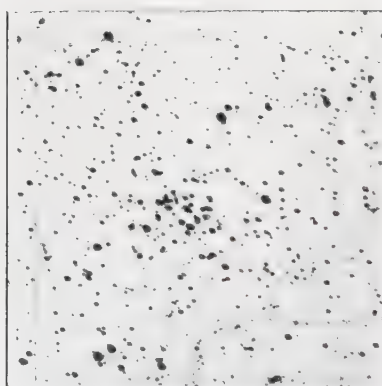


N. G. C. 4852.
(125459)

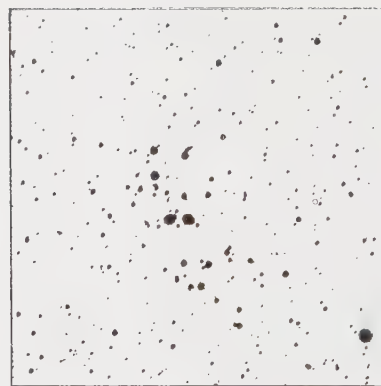
PLATE 12.



N. G. C. 2548.
(080805)



N. G. C. 5316.
(134667)



N. G. C. 5662.
(142356)



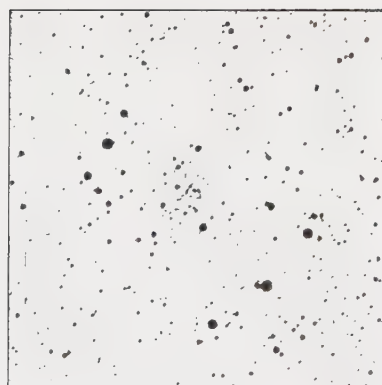
N. G. C. 2632.
(083420)

PLATE 13.

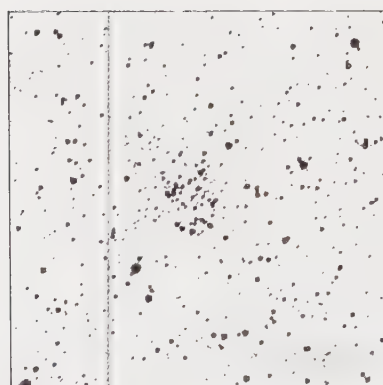


N. G. C. 2670.
(084248)

80.
(083847)



N. G. C. 5715.
(143657)

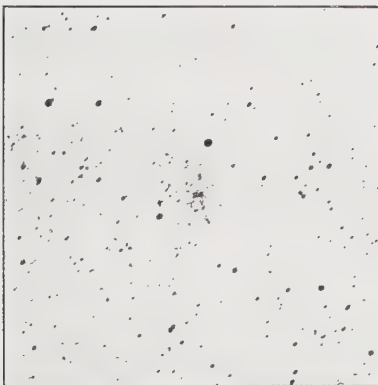


N. G. C. 5823.
(145855)

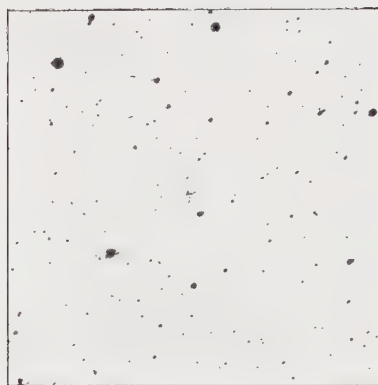
PLATE 13.



N. G. C. 2682.
(084512)

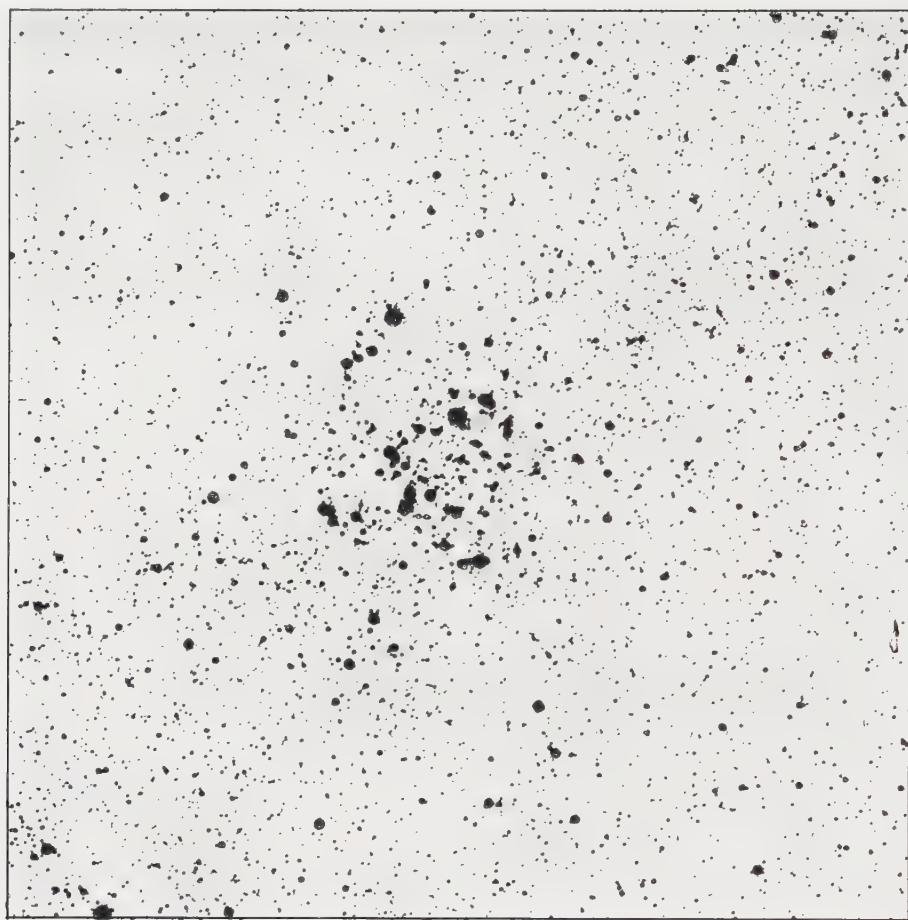


N. G. C. 5999.
(154456)

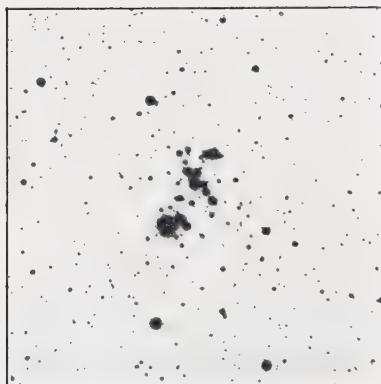


N. G. C. 6005.
(154757)

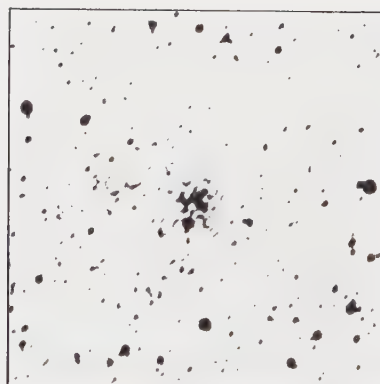
PLATE 14.



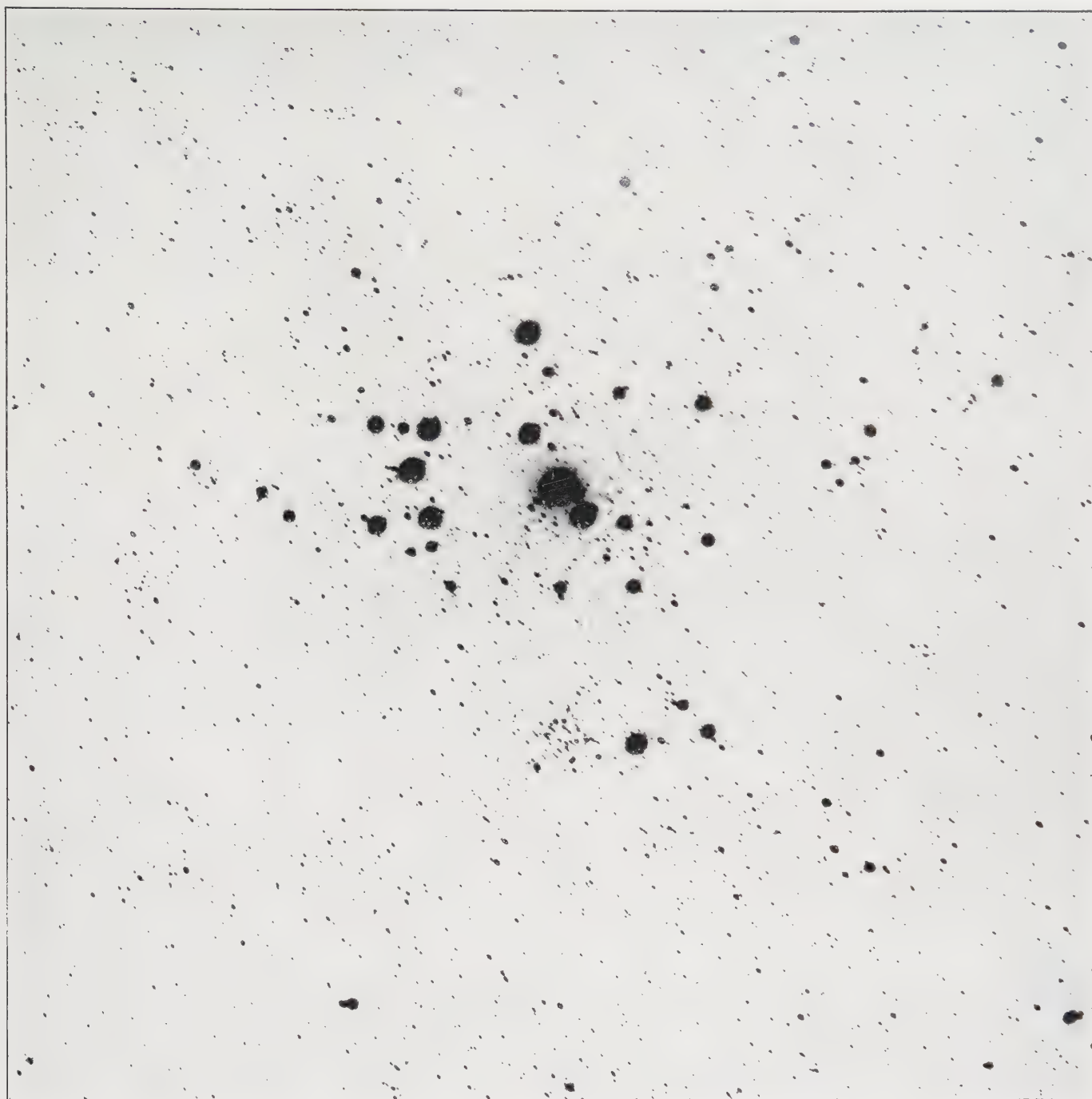
N. G. C. 3114.
(095959)



N. G. C. 6025.
(155560)



N. G. C. 6134.
(162048)



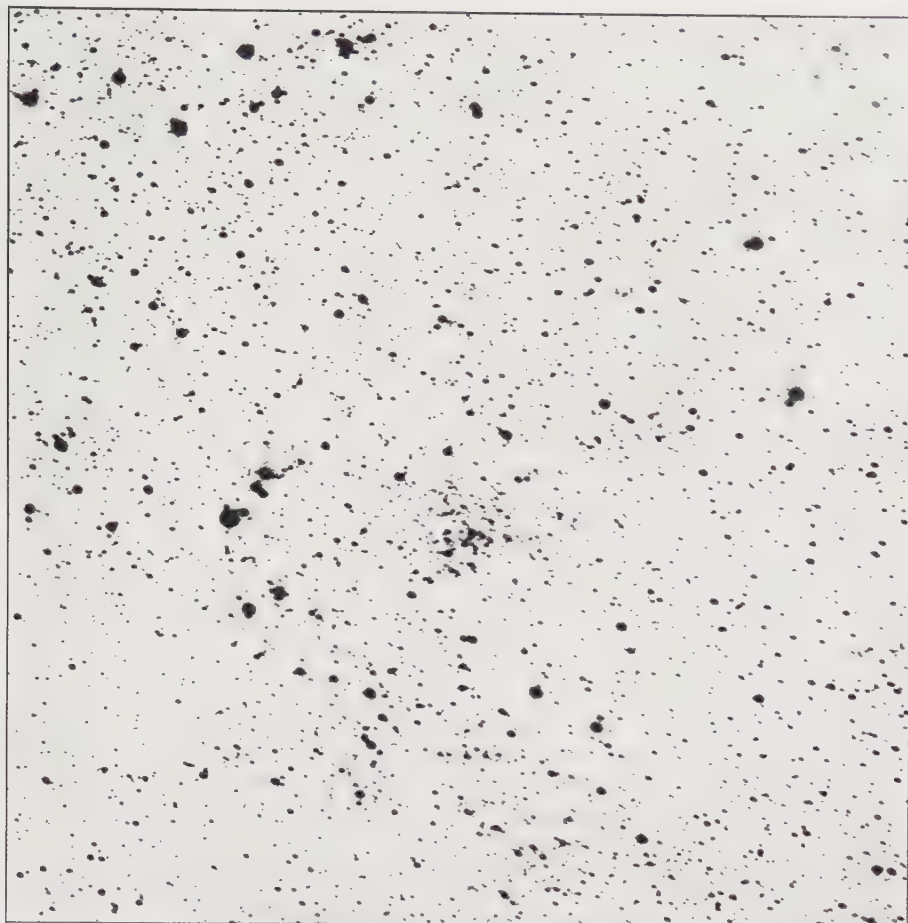
M-e 102.
(103963)

M-e 101.
(103864)

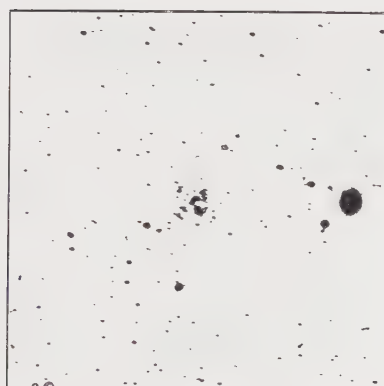
PLATE 15.



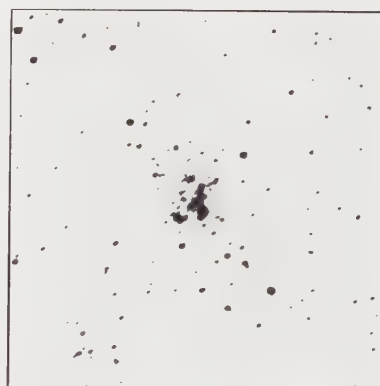
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(110258)



N. G. C. 4349.
(121961)



N. G. C. 6192.
(163343)

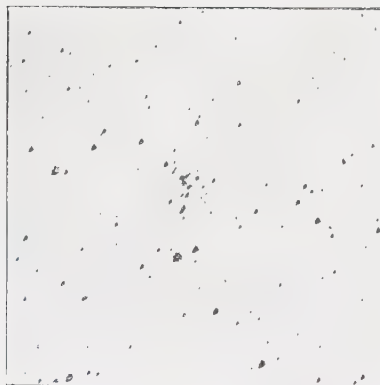


N. G. C. 6242.
(164839)

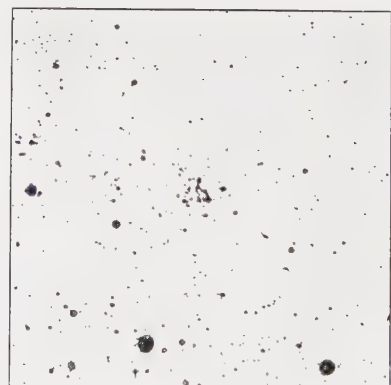
PLATE 16.



N. G. C. 5460.
(140147)



N. G. C. 6400.
(173236)



N. G. C. 6451.
(174430)

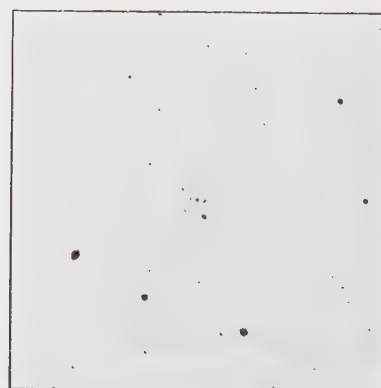
PLATE 16.



N. G. C. 5617.
(142260)

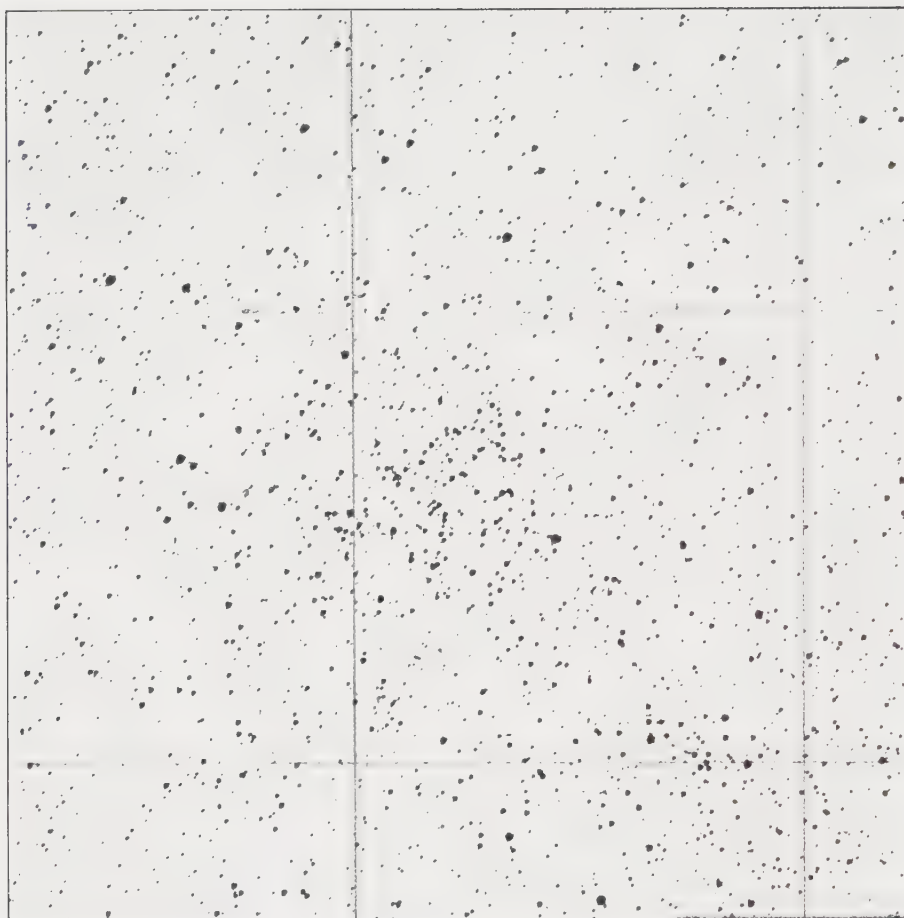


N. G. C. 6469.
(174622)

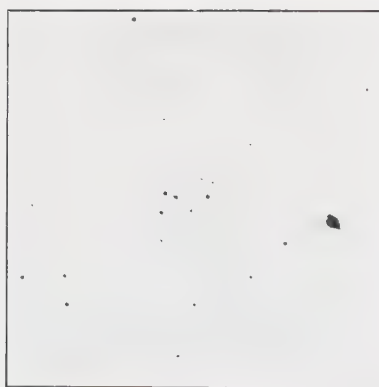


N. G. C. 6649.
(182710)

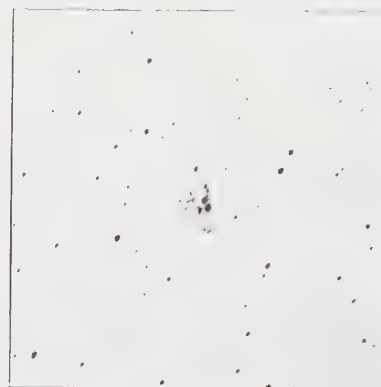
PLATE 17.



N. G. C. 5822.
(145753)

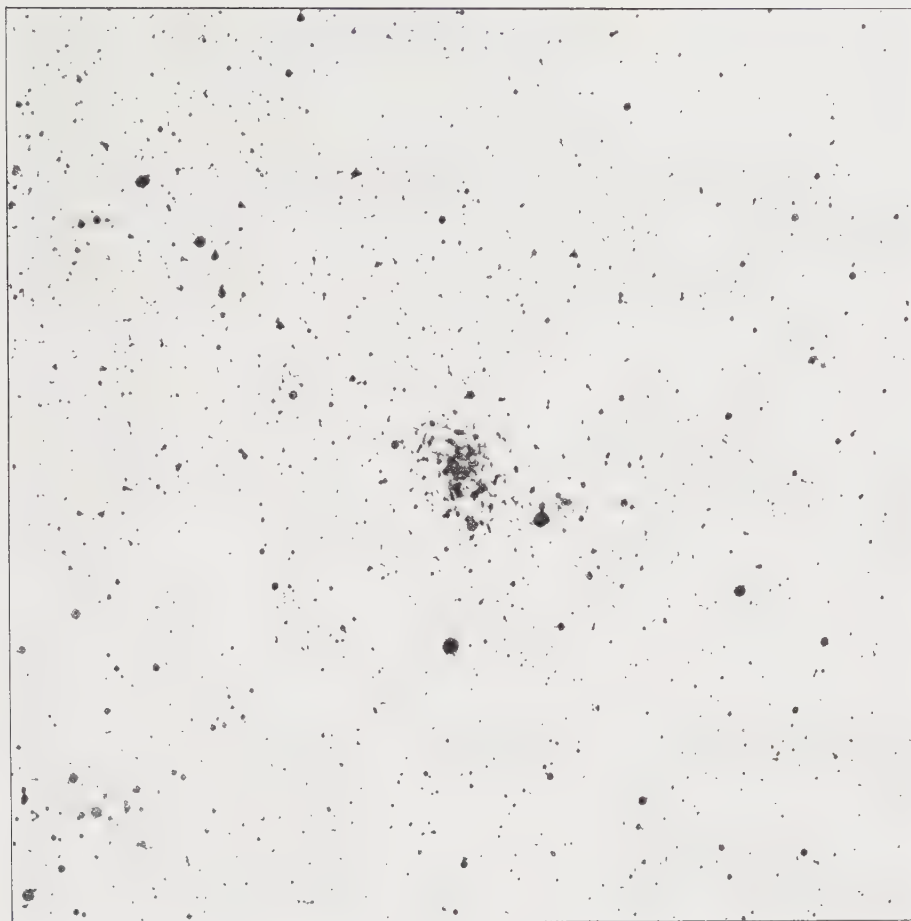


N. G. C. 6664.
(183108)



N. G. C. 6694.
(183909)

PLATE 17.



N. G. C. 6067.
(160553)

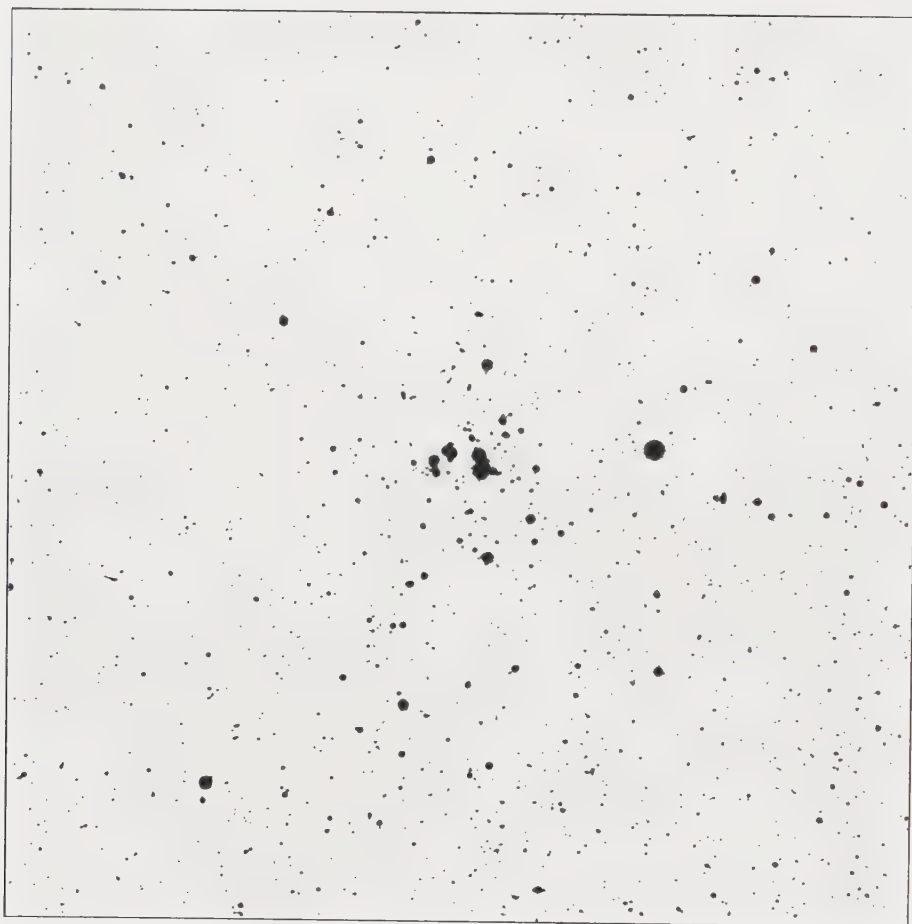


N. G. C. 6811.
(193546)

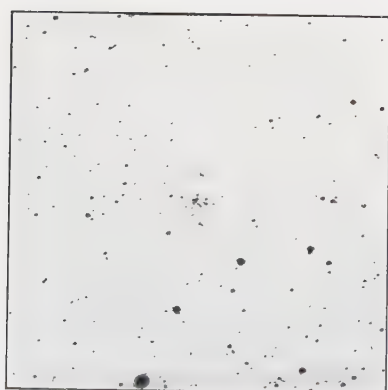


N. G. C. 6830.
(194622)

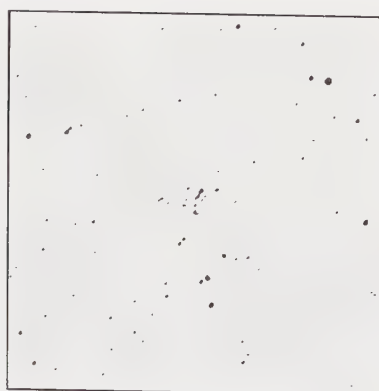
PLATE 18.



N. G. C. 6087.
(161057)



N. G. C. 6834.
(194829)

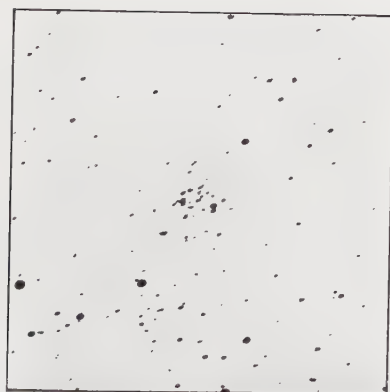


N. G. C. 6866.
(200043)

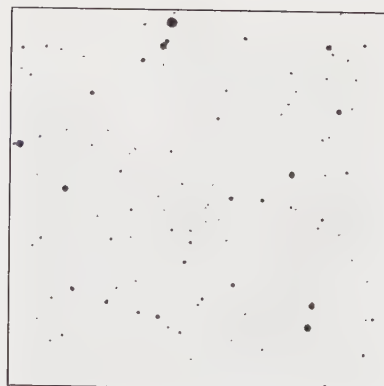
PLATE 18.



N. G. C. 6124.
(161840)



N. G. C. 7654.
(231961)



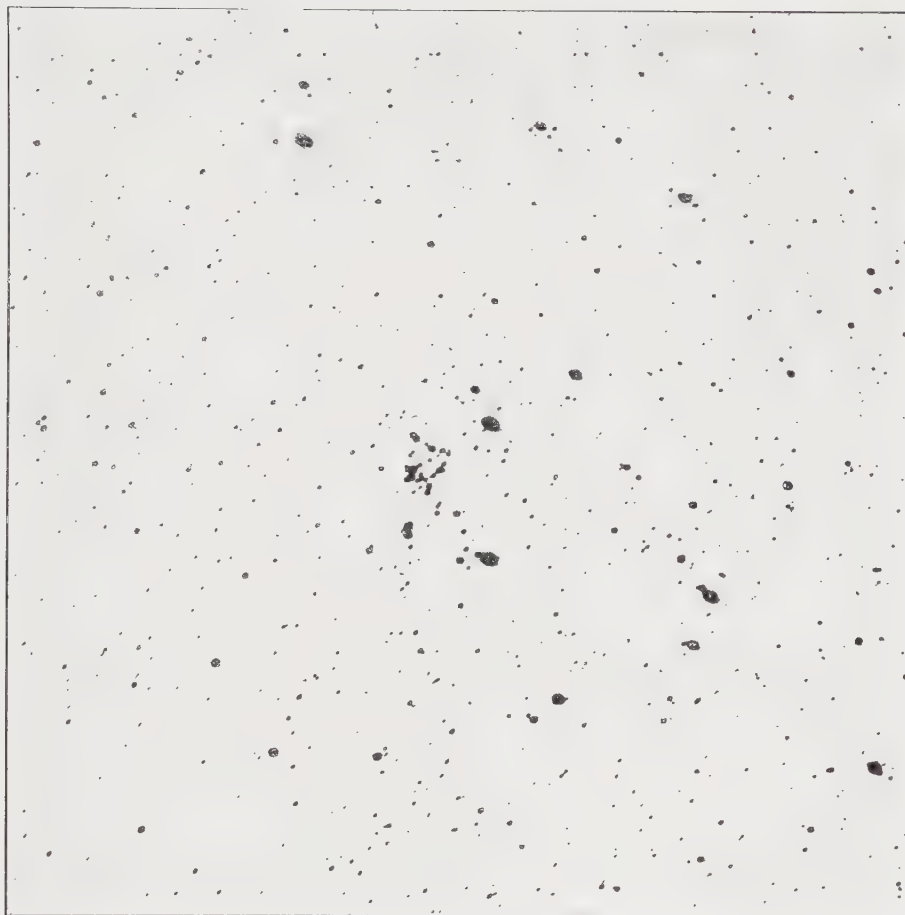
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(235256)

PLATE 19.



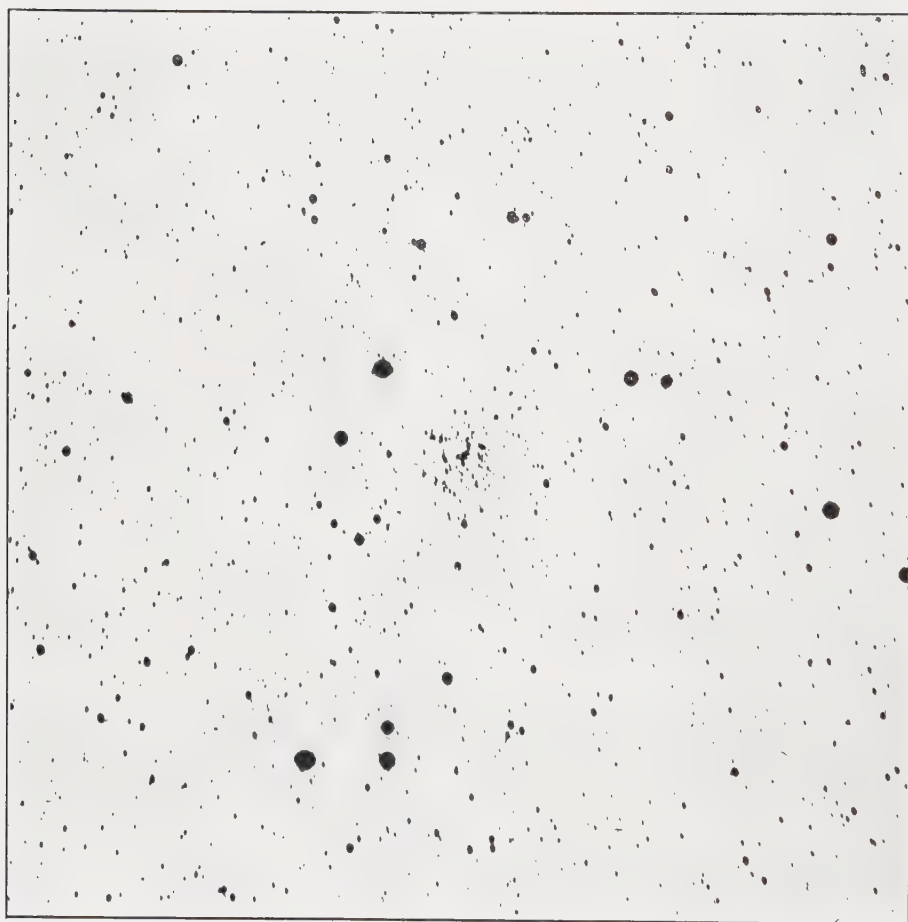
N. G. C. 6259.
(165344)

PLATE 19.



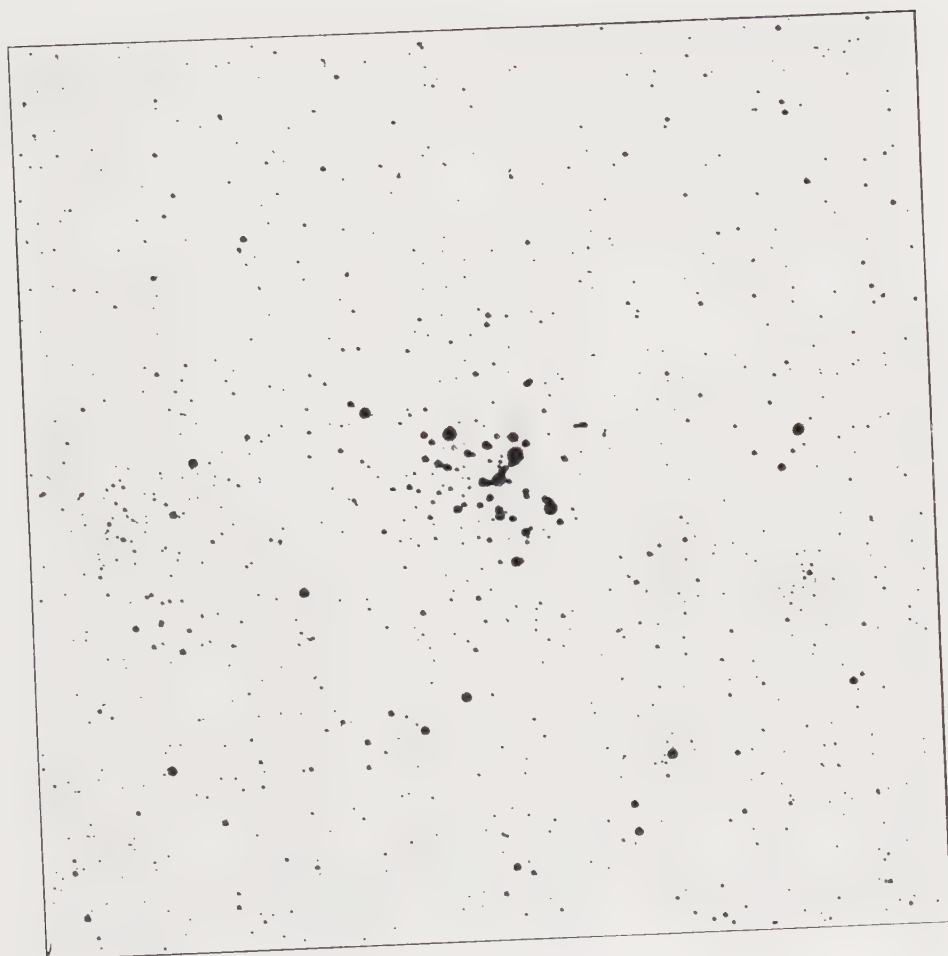
N. G. C. 6281.
(165837)

PLATE 20.



I. C. 4651.
(171649)

PLATE 20.



N. G. C. 6405.
(173332)

PLATE 21.



N. G. C. 6475.
(174734)

PLATE 21.



N. G. C. 6494.
(175119)

PLATE 22.



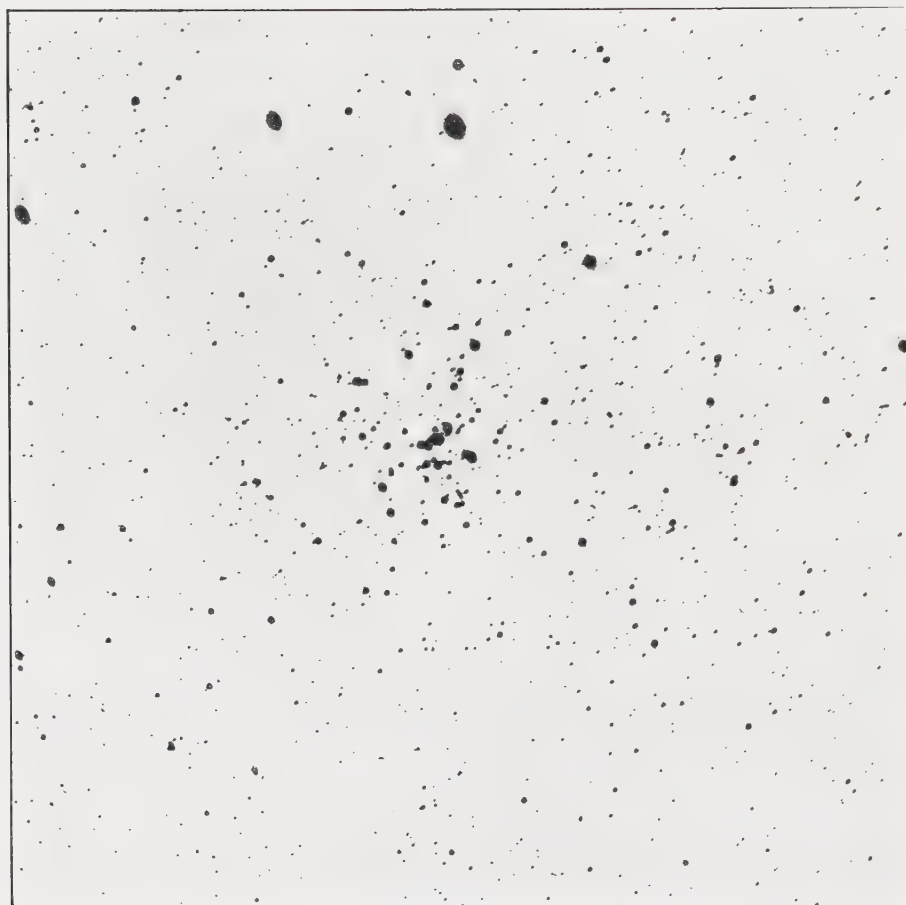
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(175822)

PLATE 22.



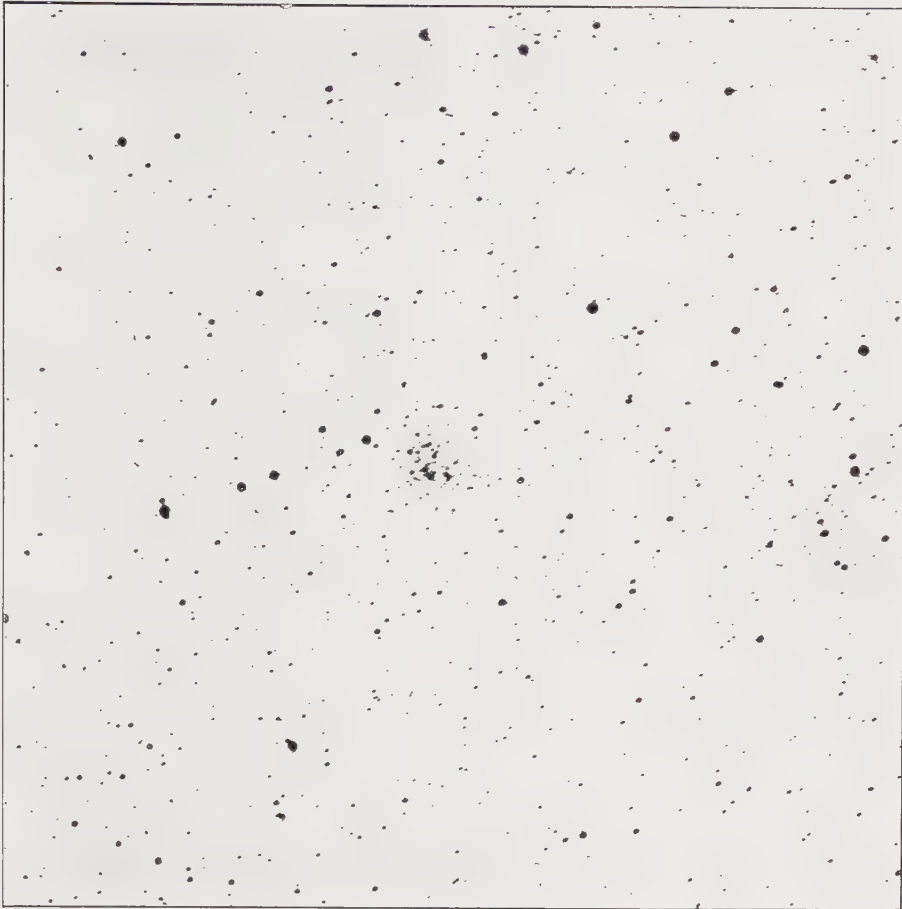
N. G. C. 6633.
(182206)

PLATE 23.



M-e 204.
(182519)

PLATE 23.



N. G. C. 6645.
(182616)



M-e 210.
(183405)



N. G. C. 6709.
(184610)

PLATE 24.



N. G. C. 6940.
(203027)

PLATE 25.



N. G. C. 7209.
(220146)

PLATE 25.



N. G. C. 7243.
(221149)

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